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ABSTRACT

This is a citizen's guide to the section 208 water quality management program. Section 208 refers to that section of the Federal Water Pollution Control Act of 1972 (the Clean Water Act) which calls for public participation in water quality management planning. Included in this guide are chapters on controlling pollution through the Clean Water Act, important requirements of section 208 water quality management planning, and programs to prevent pollution. Throughout the guide are provided technical and legal information on various issues related to water quality such as waste disposal, mining activities, septic tanks, and agricultural activities. Also included are lists of suggested citizen activities related to each issue. (BB)

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Setting the Course for Clean Water

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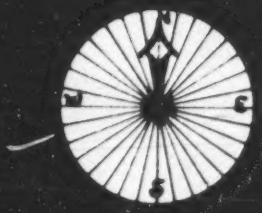

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COVER: Sloop off south shore of Buck Island, Virgin Islands National Park. National Park Service photograph.

Cover design by Mary Ann Smith

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I Introduction

This handbook is designed to enable citizens to participate effectively in a unique program which can result in clean water throughout our nation. This program is called section 208 planning, because it is required by Section 208 of the Federal Water Pollution Control Act of 1972 (P.L. 92-500, known as the Clean Water Act). Section 208 planning is also known as state or areawide Water Quality Management Planning; these terms will be used interchangeably in this handbook.

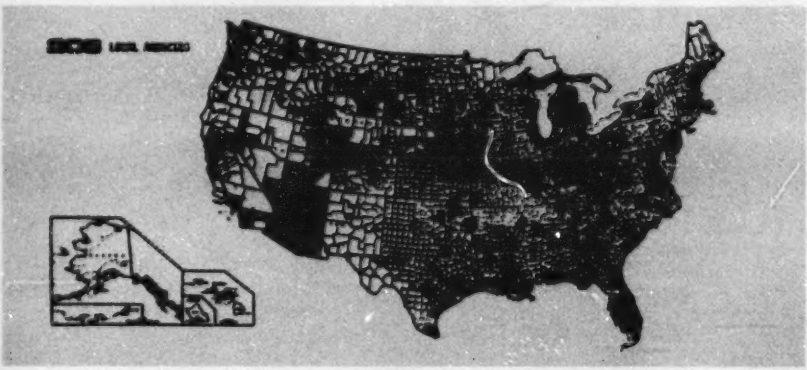
Water Quality Management Planning is being carried out by every state and in 176 specially designated areas. Congress has provided federal grants, awarded by the U.S. Environmental Protection Agency (EPA), for the preparation of these management plans. EPA has awarded over $200 million in grants thus far. All the states and all designated areas are required by law to complete their initial plans and submit them to EPA by November 1, 1978, at the latest. Plans will be updated annually. Each plan must identify all sources of water pollution within the planning area, determine how serious the pollution from these sources is, and develop means to control each type of pollution. Some of the sources of pollution which must be examined by 208 agencies are municipalities, industries, agriculture, mining, timber harvesting, and construction activities. Other local and state agencies are responsible for carrying out the recommendations of the 208 agency. It is part of the responsibility of the 208 agency to identify these implementing or management agencies.

The control measures identified by 208 planning should, as a whole, be stringent enough to attain the 1983 goal of the Clean Water Act, which is water safe for swimming, fishing, and the protection of wildlife, wherever attainable.

Congress realized that active citizen support in each locality and state would be necessary to achieve the goals of the Clean Water Act and therefore specifically provided for public participation in the planning process. The Act mandates in Section 101(e):

> Public participation in the development, revision, and enforcement of any regulation, standard, effluent limitation, plan, or program established by the Administrator (EPA) or any state under this Act shall be provided for, encouraged, and assisted by the Administrator and the States.

In perhaps no other federal law have such detailed requirements for public participation been included.



II Controlling Pollution Through The Clean Water Act

As a former head of the American Public Health Association has said, "If the fish are dying, the people are not far behind." Clean water is essential to life. The Clean Water Act recognizes the intimate relationship between all living things and their environment and establishes several programs, in addition to Section 208 planning, to clean up our waters and keep them clean. This chapter will introduce some of the important Clean Water Act programs which bear upon 208 planning.

EPA Office of Public Affairs

Potomac River Fish Kill

Goals and Objectives

The overall objective of the Act is "to restore and maintain the chemical, physical and biological integrity of the Nation's water." The Act has two specific national goals. The first is a practical goal to measure the country's progress toward clean water, which is stated in Section 101(a):

> It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water be achieved by July 1, 1983.

This goal is commonly referred to as the "1983 swimmable-fishable goal" or simply as the Act's "1983 goal."

The second goal, also stated in Section 101(a), is the elimination of all discharges of pollutants into the nation's waters by 1985.

Achieving these goals will be extremely difficult, as much of the waste from homes and industries, from pesticides and sediment runoff, and from such activities as farming, forestry projects, mining, and garbage dumping ends up in our rivers, lakes, and streams.

Consider some of the toxic chemicals that have been discharged into the nation's waters as a result of industrial activities. When carbon tetrachloride poisoned the Ohio River in West Virginia, cities along that river were asked to use other sources for drinking water. The discovery of cancer-causing polychlorinated biphenyls (PCB's) in fish in Lake Michigan closed down the fishing industry there. Although the Ohio River is again being used as a drinking water source, it will be many years before fish from Lake Michigan will be safe to eat. Other harmful pollutants are removed from our drinking water supply at an ever-greater cost.

As a result of polluted water we may lose recreational opportunities such as fishing, swimming, and boating. Polluted water may kill native fish or wildlife or destroy their ability to reproduce young.

Point and Nonpoint Source Pollution

Polluting substances can enter the water either from a specific point, such as a pipe, or in runoff from a large surface area. For the purpose of developing control programs, the Clean Water Act classifies pollutants according to the way they enter the water.

Point source pollutants are those that enter the water from any discernable, confined, and discrete conveyance such as a sewer pipe, culvert, tunnel, or other channel or conduit. The most easily identified point

sources are those that come from factories and municipal sewage systems. Pollutants which wash off, run off, or seep from broad areas of land are called nonpoint source pollutants. Common nonpoint source pollutants are sediment eroded from soil exposed during the construction of houses and pesticides and fertilizers washed off cropland by rainwater. The same substance can be both a point and nonpoint source pollutant. For example, sulfuric acid can be a nonpoint source pollutant in runoff from many strip mined areas. It can also be a point source pollutant from mining and a point source pollutant in wastewater from certain industries.

Major Water Pollutants

The primary contributors to water pollution are as follows:

- Organic wastes from urban sewage, farms and industries;
- Sediments from agriculture, construction, and logging;
- Biological nutrients such as phosphates in detergents and nitrogen in fertilizers;
- Toxic substances from industry and synthetic chemicals such as those found in pesticides, plastics, and detergents;
- Acid and mineral drainage from open-pit and deep-shaft mining;
- Runoff containing harmful chemicals and sediment drained from streets and parking lots.

Regulating Point Sources

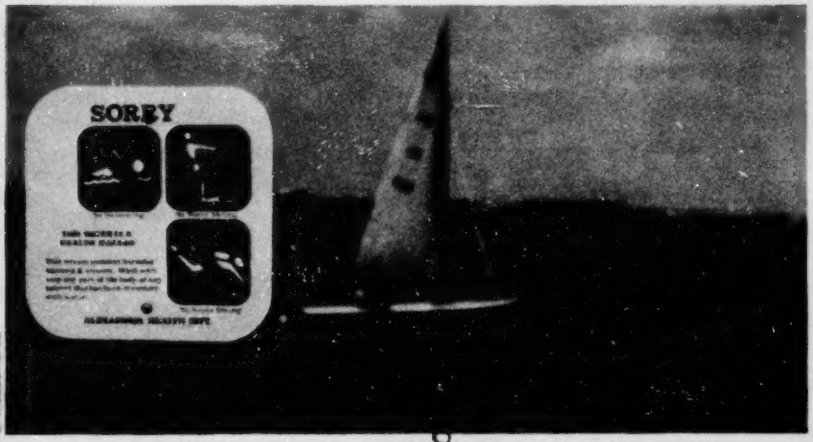
Section 208 planning will develop an overall control program that will cover both point and nonpoint sources. Plans will build on federal point source control programs which are described in the paragraphs below.

A. Industrial Point Sources

EPA has categorized industrial point sources by type of manufacturing operation. Typical categories include chemical plants, oil refineries, and steel mills. EPA has established limits on the amount and kind of pollutants (effluent limitations) that can be discharged in wastewater from industries in each category.

The Clean Water Act established a two stage control program. The first step required all industries to reach an initial level of control by July 1, 1977, that could be met by the more effective types of pollution control technology in use. The 1977 standard is called Best Practicable Control Technology Currently Available, or BPT. By 1983 all industrial point sources must meet more stringent and comprehensive standards called Best Available Control Technology Economically Achievable, or BAT. The BAT standards will cover many toxic pollutants which are not controlled by BPT.

No industrial point source can discharge wastes into a body of water unless the dis-



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charger first obtains a permit from EPA or the State under the National Pollutant Discharge Elimination System (NPDES). The permit for each discharger should state how much of any pollutant may be discharged; the time schedule to meet BPT (after 1977) or BAT (after 1983); and whatever monitoring equipment must be used.

B. Municipal Point Sources

The population of the United States and industries served by municipal sewage systems generate over 25 billion gallons of sewage *every day*. 435 communities discharge their wastes without treating it at all. Most communities at least treat wastes by screening floating solids and allowing other solids to settle out of the waste in holding ponds. This screening and settling process is known as "primary treatment." Much of this primarily treated waste water is further purified by a series of processes called "secondary treatment."

The Clean Water Act requires all publicly owned sewage treatment plants to provide secondary treatment by July, 1977. Levels of treatment higher than secondary treatment may be mandated by states where needed to meet water quality standards. About two-thirds of the 12,800 treatment plants now in operation did not meet the 1977 deadline. NPDES permits with effluent requirements are also required for municipal point sources.

Over $18 billion in federal grants was made available by Congress to assist communities in the construction or improvement of municipal treatment works. Most of that money has been committed by now, but Congress appears ready to continue appropriations at a rate of $3 to 5 billion per year.

C. Pretreatment

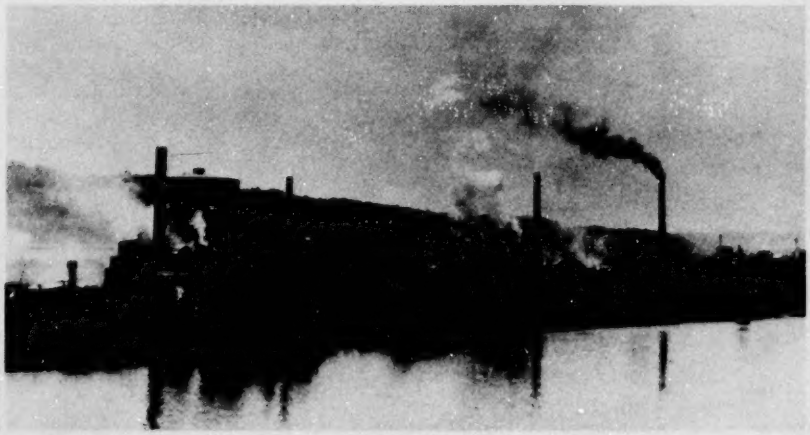
Many factories flush large quantities of chemicals and heavy metals into public sewage systems. Some of these wastes can interfere with normal sewage treatment operations at the treatment facility and/or and/or pass through the facility unaffected by the treatment processes to pollute receiving waters.

The Clean Water Act requires industries to "pretreat" waste discharging into public sewage treatment facilties to eliminate such materials before wastes are discharged into public sewage systems. As of August 1977, EPA had not made a final decision on what the pretreatment standards will be, how many industries will be covered, and what level of government will be primarily responsible to see that industries comply.

D. Other Point Source Control Programs

The Clean Water Act created several programs to regulate special types of point source pollution. These programs control

An Industrial Point Source



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toxic pollutants (section 307), thermal pollution (section 311), and pollution caused by depositing dredged and fill material in the water (section 404). Another program provides stricter effluent requirements if necessary to attain the 1983 "fishable, swimmable" goal (section 302 and sections 301 and 303).

Regulating Nonpoint Sources

The control of nonpoint sources is required for the first time under federal law in Section 208 of the Clean Water Act. Congress recognized that the 1983 goal of fishable, swimmable water could not be met by controls on point sources alone. The water pollution from nonpoint sources is enormous. Several billion tons of sediment alone wash into streams and rivers annually from nonpoint sources. By comparison, the annual sediment load from municipal and industrial discharges is in the range of 30 million tons per year.

Section 208 of the Act requires that states and localities establish programs to control nonpoint source pollution. The sources and activities to be covered include such activities as agriculture, timber harvesting, mining and construction, and other sources such as solid waste disposal sites. The Section 208 program will be discussed in more detail in the next chapter. Control programs for these sources and activities will depend primarily on pollution control practices which utilize the following general approaches: reducing the amount of runoff; reducing the amount of pollution carried by runoff; and prohibiting soil disturbing activities in fragile areas. There will be a set of practices for each different type of nonpoint source or activity.

As discussed above, the Clean Water Act sets national uniform requirements such as secondary treatment for point source dischargers. By contrast, state and local governments have been assigned the major burden and responsibility for developing nonpoint source pollution controls. This is because soil conditions and types, climate, and topography (which are the primary determinants of the rate of non-point source pollution) vary throughout the country. EPA is in the process of publishing guidance documents for all types of nonpoint source pollution which identify a number of effective nonpoint pollution control practices. Your 208 agency will use these guidance documents along with other sources of information (including information obtained through public participation) to establish the set of practices which will be used to control each type of nonpoint source pollution in your state or area. EPA will review the work of state and local 208 agencies to ensure that the control programs those agencies have developed are adequate to attain clean water.

Chapter Five will provide more information on nonpoint source control programs and will give examples of specific control practices for each type of nonpoint source pollution.

Water Quality Standards

Section 303 of the Act requires that states establish Water Quality Standards for all waters and revise them at least every three years. Revising Water Quality Standards involves several steps. Water Quality Standards have two parts, uses and criteria. First the use must be designated. EPA has stated specifically that waste disposal cannot be a designated use. Designated uses must be higher uses such as domestic water supply, agricultural water supply, swimming, boating, or others.

The next step is to identify properties and potential pollutants which affect the designated use of the water. Some properties which are usually considered are water temperature, color, dissolved oxygen content, and acidity (pH). Potential pollutants are many, including toxic substances and heavy metals such as chromium, cadmium, arsenic, and mercury; pesticides such as DDT, endrin, parathion and lindane; and other types of pollutants.

For each property or pollutant, a criterion is established which sets forth the legal limits on that particular property or pollutant. The water must meet the criteria for all properties and pollutants in order to be safe for the designated use. A partial list

WATER QUALITY STANDARD

Stream Segment: Clean Water Run from its headwaters in Piney Mountain for 5 miles until it enters Broad River
Designated Use: Trout Fishing

Criteria to attain designated use:

Dissolved Oxygen Content—Min. of 7.0 ppm*
Temperature—Max. of 20 degrees C
Cadmium—Max. of 0.0004 ppm
Chromium—Max. of 0.3 ppm
Mercury—Max. of 0.00005 ppm
DDT—Max. of 0.000001 ppm
Endrin—Max. of 0.00001 ppm
Parathion—Max. of 0.0001 ppm

*** parts per million**

of properties, pollutants and suggested criteria has been published by EPA in *Quality Criteria For Water*, which is available from the Criteria and Standards Division, EPA, Washington, D.C. 20460. It includes reference to other, more detailed sources of information on potential water pollutants.

Toxic pollutants create one of our most serious water quality problems – yet many states have failed to include limiting criteria for toxic pollutants. It is absolutely essential that states prescribe criteria for toxics in their Water Quality Standards.

A hypothetical Water Quality Standard, based on criteria actually proposed by a state, is shown on this page.

Actual water quality standards may include many more pollutants and in a few cases may allow some variation in a given criteria – such as seasonal variation in temperature.

EPA regulations required that Water Quality Standards be revised by the end of 1976. The revised standards must meet the following requirements:

1. Public health and welfare and downstream standards must be protected.
2. States must upgrade existing water quality standards where current water quality supports higher uses than those presently designated.
3. Uses must be upgraded to meet the 1983 goal of fishable, swimmable water where attainable.

States have been allowed to downgrade water quality standards in a few, very limited instances. Standards may be downgraded below their presently designated use, but not lower than actual existing uses upon a demonstration that:

1. Attainment of the higher use is impossible because of natural background conditions, such as water absorbing pollutants while trickling through natural heavy metal deposits.
2. Attainment of the higher use is impossible because of irretrievable, man-induced conditions.
3. Attainment of the existing standards would require the application of point source controls more stringent than the 1983 requirements for industrial and municipal point sources, and application of these more stringent controls would cause substantial and widespread adverse economic and social impact such as unemployment lasting more than one year that is directly caused by implementation of the controls.

Antidegradation Policy

The EPA regulations also require states to establish an antidegradation policy which must be in effect by July 1, 1977. The new policy must: (1) prohibit any water quality degradation which will interfere with or become injurious to any use actually being attained. For example, if a particular body of water is suitable for sport fishing, it cannot be degraded in any way which would reduce its quality for sport fishing; (2) prohibit, with one exception, any increase in pollutant loads in those high-quality waters which are currently better than the 1983 water quality goals. The exception is that a state can decide, after public participation, to permit lower water quality in order to allow necessary and justifiable economic or social development. This exception is narrowed by two conditions: First, it can never be applied to high quality waters which constitute an outstanding national resource, such as waters of national and state parks and wildlife refuges or waters of exceptional recreational or ecological significance. Second, it cannot be applied in any way that allows water quality to fall below the 1983 goal. Many current state antidegradation policies simply declare that no degradation of water quality is allowable except for social and economic development but do not include the two important conditions described above.

In addition to including an antidegradation statement in state law, states are required to develop, through 208 planning, a process to implement the antidegradation policy.

Basin Plans

Section 303 of the Act required states to develop information to assist point source pollution control programs and the NPDES permit program. This information, called Basin Plans or 303 Plans, was to be ready by July 1975, but some plans have never been finished. The primary purpose of Section 303 plans was to determine the amount of pollution which would be allowed from point sources and to identify effluent limited and water quality limited stream segments. *Effluent limited segments* are those stream segments which meet and will continue to meet water quality standards or will meet water quality standards once the national uniform point source controls are applied. *Water quality limited segments* are those which will not meet water quality standards with the application of point source controls.

Where water quality limited segments were identified, Basin Plans were also required to compute the amount of pollution (usually in pounds per day of various types of pollutants) which could be discharged into the segment without violating Water Quality Standards. This amount is called Total Maximum Daily Load.

Basin Plans, even those that were not completed, will provide some basic information that 208 agencies will use in determining the role of point source controls. Basin Plans will need revision, however, because they were prepared early and their effluent limitations are now low, because they were not designed to meet the 1983 BAT requirement, and because they only peripherally addressed nonpoint sources. Applicable portions of Basin Plans will be incorporated into the Water Quality Management Plan.

* * * * * *

As you become more involved with 208 planning you will want to know more about the Clean Water Act programs introduced in this chapter. The following sources will provide additional information:

- *Toward Clean Water: A Guide to Citizen Action*, 1976, The Conservation Foundation, 1717 Massachusetts Avenue, Washington, D.C. 20036, $8.00
- *Water Quality Standards* (Chapter Five of Water Quality Management Guidelines), EPA, 1976, Available at no charge from the Water Planning Division, (WH-554), EPA, Washington, D.C. 20460
- *Annotated Bibliography for Water Quality Management*, 4th Edition, EPA, 1977, Available at no charge from the Water Planning Division
- "Section 208 and Section 303 Water Quality Planning and Management, Where is it Now?" by Diane L. Donley and Khristine L. Hall, *Environmental Law Reporter*, October 1976

III Important Requirements of Section 208 Water Quality Management Planning

The Section 208 Water Quality Management Planning program requires the development and implementation of a plan containing management and regulatory programs to control point and nonpoint source pollution. These management plans must be developed by November 1, 1978. The overall objective of the plans is to achieve the Clean Water Act's 1983 goal which is stated in section 101(a)(2) of the Act:

> It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983.

A Section 208 Water Quality Mangement plan differs from earlier planning efforts in two fundamental ways:

1) The plan must be able to be implemented. It cannot merely describe problems or list goals and objectives; it must include the actual implementation measures to solve water quality problems identified.

2) For the first time nonpoint sources of water pollution must be controlled.

Section 208 plans must address the following specific categories of polluting or potentially polluting activities and sources:

- Municipal wastewater treatment
- Industrial wastewater treatment
- Urban stormwater
- Agricultural activities
- Logging and related activities(silviculture)
- Mining and related activities
- Construction activities
- Salt water intrusion into surface waters
- Disposal of wastes by pumping into wells or subsurface cavities (well injection or deep-well injection)
- Construction or operation of hydrologic modifications such as dams, levees and flow diversion structures
- Residual waste disposal, such as solid

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waste landfills or disposal sites for municipal or industrial sewage treatment plant sludge.

The 208 plan will identify future sources of pollution and provide methods to control those sources so that clean water, once achieved, will be maintained. EPA has required 208 agencies to identify priority problems and develop programs to control those problems first. For municipal and industrial point sources the plan must anticipate treatment needs over a 20-year period. Plans must include federal programs under the Clean Water Act such as point source requirements (BPT, BAT, secondary treatment) that are enforced through the NPDES permit system. They must also assess other state and local programs such as the sediment control ordinance in Montgomery County, Maryland; the Pennsylvania strip mining control law; and others, to see if they are adequate in scope and concept, if they have sufficient funds and personnel, and if they are working. Where such programs do not exist or are inadequate, 208 plans should specify new programs or identify changes needed in existing onces. Developing adequate programs may involve drafting and introducing legislation, adding personnel, increasing funding through existing sources, finding new funding sources, or other measures.

It should be absolutely clear that 208 agencies are responsible for identifying or developing specific control programs and schedules for significant nonpoint source pollution problems. EPA will permit the development of programs to control lower priority pollution problems to be deferred until after the initial plan is completed.

State and Areawide Programs

The Water Quality Management Plan for the state will include plans being prepared for specially designated local areas. State plans will cover the remainder of the state and will address any problems the local areas are unable to solve. State and areawide plans must meet all of the requirements of Section 208 of the Clean Water Act, and the state must ensure that the results of both state and local planning efforts meet those requirements. Both state and areawide Water Quality Management Planning are now going on simultaneously.

Designated areas are areas which have especially severe pollution problems because they are heavily industrialized or highly urbanized, or areas which have especially high quality water which needs protection. Most state 208 planning is just getting underway and the early planning steps are therefore still flexible. By contrast, many areawide plans are nearing completion.

Essential Requirements of Section 208 Planning

Section 208 plans must be completed within two years after the planning process begins. All Plans must be completed and submitted to EPA by November 1, 1978 at the latest. The plans which result from the initial two year planning period will be updated every year. This process of updating and modifying plans is called the Continuing Planning Process.

This section discusses the most important elements of the initial two-year planning period which is critical in developing a plan capable of producing swimmable, fishable water by 1983. These elements include (A) Water Quality Standards and the state antidegradation policy: (B) the state/EPA agreement; (C) the detailed workplan; (D) developing Best Management Practices; (E) developing an information base for point source control programs; (F) establishing necessary control programs; (G) designating management agencies; and (H) approving the final plan. Suggestions for citizen action are included following the discussion of each element.

A. Water Quality Standards

Some of the mechanics and terminology of Water Quality Standards were discussed in Chapter II. EPA regulations require Water Quality Standards be set at the 1983 goal where it is attainable. Where it is not attainable, the regulations require that standards be set to include those beneficial uses which are being or can be attained.

Thus Water Quality Standards, if they are set according to regulation, apply the 1983 swimmable, fishable goal to each stream segment. Because they express the 1983 goal, Water Quality Standards set the objectives of 208 planning. If Water Quality Standards are good, then planners are at least setting out to achieve a worthwhile goal. If Water Quality Standards are not good – if the uses are not "high" enough or the criteria will not provide water quality sufficient to support the designated uses, then 208 planning may turn out to be a wasted exercise.

Note that water quality in a particular stream segment can be higher than the Act's 1983 goal. If so, the antidegradation policy requires the goal of the 208 plan to be maintaining the higher use – not merely the 1983 goal. For instance, if a body of water is pure enough to drink, then the 208 plan that covers that water should see that it remains that pure.

CITIZEN ACTION:

As you begin your involvement with 208 planning, evaluate existing water quality standards. Do you agree with the uses and criteria? As a rule of thumb, question any standard which has been "downgraded" or any criterion which has been set lower than the level recommended in *Quality Criteria For Water*. Remember, 208 plans can recommend raising uses and criteria which are set too low.

B. State/EPA Agreement

This agreement should be the first step as a state begins 208 planning. The agreement is important because it sets forth in concise form what the state intends to do – problems to be addressed and timing to be followed. If a state does not have one or more of the "208 problems" listed on page 10 the agreement should certify that the problem does not exist in that state. EPA regulations require public participation in the development of the state/EPA agreement.

Agreements must be approved by EPA. They should be finalized before the state proceeds to the next step – preparation of detailed workplans. However, EPA has not insisted that this be done. Rather, EPA is allowing states to make the agreement the first output of the planning process once the detailed workplan has been completed. This places citizens at a disadvantage, because it eliminates an important public participation opportunity in the early stages of state 208 plan development and forces citizens to react to the detailed workplans before they see the comprehensive overview that the state/EPA agreement would have provided.

CITIZEN ACTION

1. Ask your state for a copy of the state/EPA agreement. If there is none, ask for a time schedule for the preparation of the agreement.

2. Ask when and how public participation is to be included in the agreement.

C. Detailed Work Plans

These must be prepared by both states and designated agencies. Workplans for most presently designated areas have long since been approved. The workplan should set forth in detail the problems to be addressed, the priority of each problem, the time frame for addressing each problem, possible solutions that can be foreseen, and the planning budget. Workplans should be prepared with citizen participation, but many have not been.

The objectives in each part of the workplan should be understandable and concise. Each part of the workplan designed to address a particular problem and should lead to a result that can be implemented. Existing laws and programs which might provide solutions and agencies which might implement solutions should be listed for each problem area. The planning agency should bring all the information necessary to understanding the planning process together in one, or at most two, documents. Thus after reading the State/EPA agreement and the detailed workplan citizens should be able to understand in detail the program set forth by their state or area.

CITIZEN ACTION

1. Ask for a copy of the state or areawide workplan. Ask your 208 agency for a public briefing if one has not been provided. If a public briefing has been held, arrange to

have someone from the agency staff explain the workplan to you.

2. Check to make certain that problems listed in the workplan are being developed into solutions which can be carried out. For example, a report on the problems caused by erosion and sedimentation from construction activities is not itself a solution.

3. Read the appropriate section in Chapter V that explains a particular problem in your area or state for ideas of the kinds of efforts your agency must make to develop solutions. If you do not think the workplan is complete and specific, inform the state and EPA. Make specific proposals for changes and ask for a public hearing on the need for changes. Your agency could issue documents which are official supplements and revisions to the workplan. EPA can require your agency to carry out the workplan the agency develops.

4. For more information obtain a copy of the EPA *State Continuing Planning Process Handbook*, from the Water Planning Division (WH-554), EPA, Washington, D.C. 20460.

D. Developing Best Management Practices

Identifying Best Management Practices (BMP's) is one of the most important tasks in 208 planning. BMP's are the techniques that will be used to control pollution from nonpoint sources. EPA defines Best Management Practices as:

> a practice or combination of practices that is determined by (a designated planning agency) after problem assessment, examination of alternative practices, and appropriate public participation to be the most effective, practicable (including technological, economic and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals.

BMP's are required for all nonpoint pollution problems. One example of a BMP is contour plowing to prevent erosion from agricultural activities. BMP's can also be land use controls where land use controls are an effective means of nonpoint source pollution control.

CITIZEN ACTION

1. Ask your agency if it is establishing BMP's for the different nonpoint source pollution problems it has identified. If not, urge your agency to do so.

2. Ask your agency to establish committees to develop BMP's for each nonpoint source or activity. These committees should consist of technical experts, the owners or operators of affected activities, labor unions,

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industries, environmentalists, and other concerned citizens.

E. Developing Information for Point Source Control

The means of point source pollution control have already been established – effluent requirements (such as BPT, and secondary treatment) enforced through the NPDES permit program. The most important parts of the data base which your 208 agency will develop, are projections of population size and land use, assessments of water quality and existing pollution problems, and activity over the next 20 years. The projections will be used to forecast future municipal and industrial wastewater treatment needs. More detail on the municipal wastewater treatment portions of 208 plans is found in the first section of Chapter V.

F. Establishing Control Programs

The 208 agency will identify water pollution problems, such as sediment which is running off construction sites or salt water intrusion into freshwater streams. The agency must find a solution for each problem. Possible BMP's for the construction site problem might include covering exposed ground with mulch; reseeding exposed areas immediately; and/or exposing only portions of a site and then covering them with mulch before laying bare additional ground.

The 208 agency must next identify measures to ensure that a particular solution will be implemented through a regulatory or non-regulatory program. In the construction runoff example, a possible regulatory program might require that all ground exposed by construction work be mulched within 48 hours of the time it is first exposed, provide for inspections to make sure the requirement is met, and increase building permit fees to pay the salaries of inspectors.

The authority and responsibility of 208 agencies to develop regulatory programs is very broad. Section 208(b)(2)(c) requires the establishment of regulatory programs to regulate the location, modification, and construction of any facility within the planning area which may result in any discharge of pollutants into the water. EPA has interpreted the term "facility" to mean any controllable source of point or non-point pollution. This includes steel mills, single family homes, and any pollution source in between. For the smaller, more diffuse sources, land use controls and practices are likely to be the most effective and least costly form of regulation. Land use controls and practices listed in EPA 208 guidelines include: zoning, subdivision regulatory programs where they are the most practicable means of control. Where side development regulations, drainage regulations, sediment control ordinances, and septic tank ordinances.

EPA requires control programs only where a pollution problem from a particular source is significant. EPA will require regulatory programswhere they are the most practicable means of control. Where a problem is already controlled by a regulatory program, EPA will *not* permit the substitution of a voluntary program or a less stringent regulatory program.

In order to be approved by EPA as meeting the requirements of Section 208 of the Act, a regulatory program must include the following:

1. Authority to control the problem which the program addresses;
2. Authority to require BMP's to be carried out;
3. Authority to revise BMP's when revision is needed;
4. Monitoring and inspection authority;
5. Authority to implement the regulatory control tools that will be used such as permits, licenses, contracts, notifications, bonds, leases, plans, or others;
6. Enforcement authority; and
7. A designated management agency with necessary expertise, adequate staff, adequate funding and authorities needed to regulate sources of pollution.

In order to be fully approved, the laws and regulations which provide the authority to carry out the regulatory program must be in effect, and the agency must have its staffing and budget available.

Non-regulatory programs also have to meet specific criteria in order to be approved by EPA. A non-regulatory program can be approved only if it meets the following conditions:

1. It must include an effective educational program to inform the affected public of the program's requirements;
2. Adequate technical assistance and financial assistance must be available to administer and implement the program;
3. BMP's must be identified before the program commences;
4. It must include a schedule of milestones which will indicate progress in implementing the program, progress in water quality improvement, or measures to evaluate the program; and
5. There must be an agreement on a system for reporting progress to the EPA Regional Administrator at least once a year.

EPA will require a regulatory program to replace any approved non-regulatory program which does not lead to improved water quality or if the agreed upon milestones are not met.

CITIZEN ACTION

1. Make sure the personnel in your 208 agency understand that both mandatory and voluntary programs must meet specific criteria. If they don't, contact EPA and request that an EPA representative come to your state or area and give a briefing on control program requirements for the 208 agency and the public.

2. A slide presentation (and accompanying cassette) on 208 requirements for control programs can be obtained from the Public Participation Coordinator in each EPA Regional Office.

G. Designating Management Agencies

Areawide 208 agencies, are primarily planning agencies. The plans they develop will be implemented by management agencies which have the authority to carry out the plan. These management agencies may be existing agencies or those created in response to 208 planning. State 208 agencies often have both planning and management authority. The exact authorities required of each management agency depend on the nature of the plan and the portion of the control program assigned to it. Management agencies may require authority to manage waste treatment works, construct waste treatment works, accept and utilize grants, raise revenues, incur indebtedness, levy fines, make inspections, require BMP's, issue stop work orders, or issue permits. Other possible authority is listed in EPA regulation 40 CFR 131.11 (o)(2).

These management agencies are to be designated by the governor of each state for both state and areawide 208 plans. Thus, when a plan is sent to the governor for approval, it must recommend agencies capable of carrying out the plan. Agencies which are good candidates for management agencies can usually be identified early and should be involved in the planning process. A local sewer authority should be involved in municipal point source planning, for example. Conservation districts are logical organizations to involve in agricultural nonpoint source control planning.

Some control programs may involve more than one management agency. In such cases an interagency agreement is required. For example, the public works department may be responsible for sewers and treatment plants, but the highway maintenance department may be responsible for street cleaning. The 208 plan could propose to control pollution in stormwater runoff by a program of improved street cleaning and catch-basin cleaning. Since curbside catch-basins are part of the sewer system they would be under the jurisdiction of the sewer authority; however, the highway maintenance department might be the logical agency to clean both streets and catch-basins. The 208 agency should anticipate the need for an agreement between public works and highway maintenance and take action to see that it is made.

The simple example given above should not mislead the reader. Interagency agreements may be the key to success for many control programs, but they may be complicated and difficult to obtain. The 208 agency must do more than just recommend such agreements; it should make a serious

effort to have them negotiated and signed.

CITIZEN ACTION

1. Ask your agency if it is examining the need for new legal authority, staffing, and budget for management agencies. Ask the agency to initiate the passage of any needed legislation. This may include writing draft legislation, working for its introduction into state or local legislatures, briefing legislators, obtaining support for the legislation from agency officials, and testifying at legislative hearings.

2. Additional information on regulatory programs and management agencies can be found in *Legal and Institutional Approaches to Water Quality Management Planning and Implementation*, EPA, 1977, and *Compilation of Federal, State and Local Laws Controlling Nonpoint Pollutants*, EPA, 1975. These references can be obtained from the Water Planning Division or from the Public Participation Coordinator in each EPA Regional Office.

H. Approving the Final Plan

Planning agencies have two years to complete their plan. All plans should be completed, certified by the governor, and forwarded to EPA by November 1, 1978, at the latest.

Before a state or areawide 208 agency completes its plan, a draft must be available to the public for review. Public hearings on the draft will probably be held. They must be held if citizens request them. Hearings should address all aspects of the plan including problems, solutions, BMP's, regulatory programs, non-regulatory control programs, management agencies, funding, monitoring of results, public participation, attainment of Water Quality Standards, and others. If alternative solutions to water quality problems are being proposed they should be presented to the public for comment. After the public hearing the plan should be put in final form and sent to the governor for certification. EPA requests (but does not require) that it receive a copy of the plan at this time. Once the governor has received the plan, local governments have 30 days to comment to the governor. The governor may assume that any governments which do not comment in the 30 day period support the plan. Once the plan has been submitted to the governor, he or she may do one of three things:

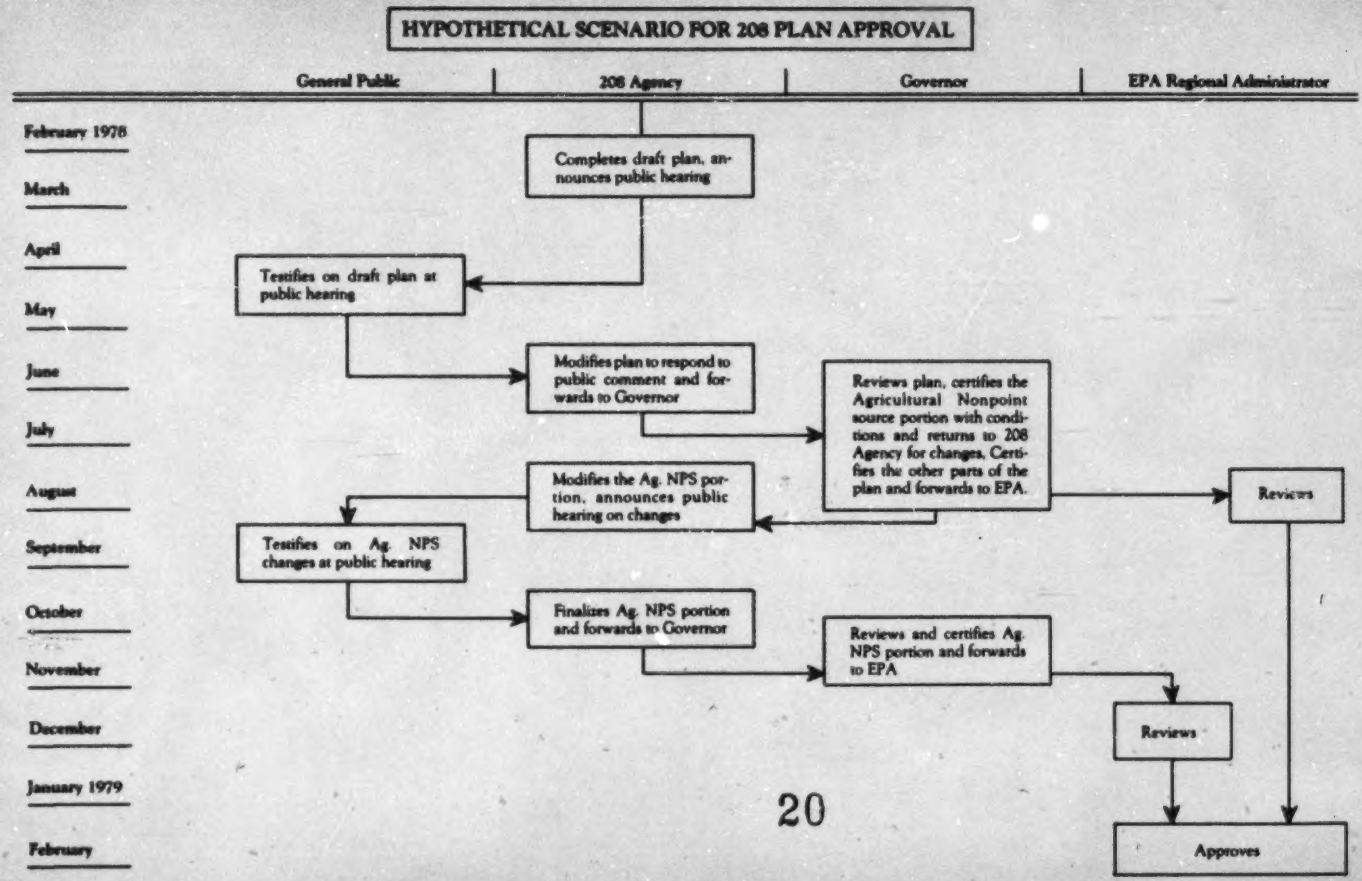
- Certify the plan and send it on to EPA. Certification means that the plan (1) meets 208 requirements; (2) will lead to attainment of Water Quality Standards; (3) is consistent with state laws, except where the plan recommends that new laws be passed; (4) provides an adequate basis for selection of management agencies; and (5) is adopted by the state.
- Certify the plan with conditions, send the plan on to EPA with the conditions indicated, and simultaneously send it back to the planning agency to satisfy the conditions within a specified period of time.
- Disapprove the plan and send it back to the planning agency for changes within a specified period of time.

When plans returned to the planning agency are changed and resubmitted, they must go through the same approval procedures as the initial submissions.

Plans certified or conditionally certified by the governor are then submitted to the EPA Regional Administrator for approval. This EPA review is critical, because EPA is responsible for ensuring that the plan meets 208 requirements before it is approved. The Regional Administrator must act within 120 days of the time he or she receives the plan. The Regional Administrator has the same options as the governor—approval, conditional approval and return for changes to obtain approval, disapproval and return for changes to obtain approval.

The Regional Administrator will review the plan on an element-by-element basis. As a result, some elements may be approved, some conditionally approved, and some disapproved. For the plan to be fully approved, *all* elements must be fully approved. The chart below portrays a hypothetical scenario for plan approval which illustrates some of the possible combinations.

If a portion of the 208 plan is completed early it may be forwarded to the governor for approval immediately. These early results, called "interim outputs," are subject to the same approval process as the entire plan. Few interim outputs have been submitted for approval; in most cases they have


HYPOTHETICAL SCENARIO FOR 208 PLAN APPROVAL
General Public
208 Agency
Governor
EPA Regional Administrator
February 1978
March
April
May
June
July
August
September
October
November
December
January 1979
February
Completes draft plan, announces public hearing
Testifies on draft plan at public hearing
Modifies plan to respond to public comment and forwards to Governor
Reviews plan, certifies the Agricultural Nonpoint source portion with conditions and returns to 208 Agency for changes. Certifies the other parts of the plan and forwards to EPA.
Modifies the Ag. NPS portion, announces public hearing on changes
Reviews
Testifies on Ag. NPS changes at public hearing
Finalizes Ag. NPS portion and forwards to Governor
Reviews and certifies Ag. NPS portion and forwards to EPA
Reviews
Approves

consisted of information to guide municipal sewage treatment facility construction programs.

Sanctions

It is possible that despite your efforts and the efforts of your fellow citizens, a state or designated area may fail to complete its plan when it is due or may produce a plan which does not meet the requirements of section 208. This raises one of the more serious issues involved in the section 208 planning process—how will EPA's section 208 planning regulations be enforced? What will happen if a state or area does not complete its plan on time or does not prepare an approvable plan?

The law gives EPA several strong sanctions which it can apply if a state or area fails to fulfill its section 208 planning responsibilities. Two are required by the Clean Water Act:

- withholding federal grants for construction of sewage treatment works which do not conform to an approved plan.
- neither granting nor renewing any NPDES permit which does not conform to an approved plan.

Additional options which EPA could exercise under the Clean Water Act include:

- withholding additional section 208 planning grants and section 106 grants federal grants to states for the administration of their overall water pollution control programs).
- suing to have the original grant agreement carried out (called suing for specific performance).
- suing to recover the amount of the planning grant.

EPA has no expressed policy on the use of the sanctions at its disposal; however, the record of the 208 planning program to date suggests that the agency will rely primarily on a persuasive approach. This approach avoids sanctions in favor of encouragement and technical guidance from EPA to 208 agencies and responsible governments. In keeping with the persuasive approach, it appears that EPA will disapprove a few, if any, section 208 plans. However, because of the short time frame and comprehensive planning requirements, and because all plan elements must be approved in order for the plan to be approved it is unlikely that many plans will qualify for full approval either. The vast majority of plans will probably fall into the conditionally approved catagory. EPA has expressed no position on how widespread use of the conditional approval category will effect the use of the sanctions listed above.

The Continuing Planning Process

EPA regulations provide for annual updating and revision of 208 plans, additional planning to improve conditionally approved plans so they can qualify for full approval, and action to implement control programs. This is called the Continuing Planning Process. The public participation requirements which are part of section 208 planning apply equally to the Continuing Planning Process. Thus citizens should have an important role in the Continuing Planning Process and should participate in overseeing implementation of the plan.

CITIZEN ACTION

1. Ask your agency if it has developed a process for plan revision.

2. Make certain advisory committees are part of the revision process. Citizens with an interest in water quality should seek membership on Policy Advisory Committees and Citizen Advisory Committees if the membership of these committees is not balanced or existing members become inactive and cease to attend regularly.

3. Advisory committees should be concerned with the implementation of the plan. If advisory committees are not given a meaningful role in assessing and overseeing the plan implementation, citizens should ask the 208 agency to give the committee such a role.

4. Where plans are not being implemented effectively, citizens should alert the 208 agency and the management agency and ask for improvement. If these agencies do not respond, citizens should inform the EPA regional office and ask EPA to determine why the plan is not being carried out. If EPA action does not lead to implementation, citizens should ask EPA to invoke the sanctions at its disposal.

IV Citizen Role in 208 Planning

Under the public participation requirements of the Clean Water Act citizens must not only be provided with information; they must also be involved in the decisionmaking process itself. This chapter will describe EPA public participation requirements and specific public involvement programs which must be carried out by all 208 agencies. We will first set forth several general principles to guide citizens to more effective involvement in 208 planning.

- Your participation in 208 planning is a right, not a privilege. EPA and 208 agencies must assist you in becoming involved and must provide means for any interested citizen to take part in 208 planning decisions. Your rights to participate are set forth in writing in Section 101(e) of the Clean Water Act, in EPA regulations (40 CFR 105), and in the *EPA Public Participation Handbook for Water Quality Management*. These publications are available without charge from the Water Planning Division (WH-554), EPA, 401 M Street, S.W., Washington, D.C. 20460 and from the Public Participation Coordinator in EPA Regional offices. You should obtain copies and become fully aware of your rights to participate.
- Become familiar with the 208 planning requirements. If you understand 208 planning requirements clearly, you will be a more effective participant. Obtain and read Section 208 of the Clean Water Act, EPA 208 regulations (40 CFR 130, 131) and EPA 208 guidelines (*Guidelines to State and Areawide Water Quality Management Program Development*). These are available from the Water Planning Division and the Regional Public Participation Coordinators.
- Water pollution cannot be prevented without control programs. 208 plans will not play the meaningful role in the national water cleanup effort which they are assigned by the Clean Water Act unless the plans result in specific programs to prevent water quality degradation. Although control programs are required by law and EPA regulations some plans have not developed them. Instead they have merely listed problems and pollution control objectives. Citizens should inform their 208 agency and responsible state and local officials that control programs must be developed.
- The formal public participation programs designed by EPA give influential specified roles to elected officials. Few such roles are allotted to the general public. Therefore, citizens should give a high priority to influencing 208 planning through their elected officials who have important roles in the planning process.

EPA Public Participation Requirements

As indicated above, the public participation mandate of the Clean Water Act is carried out through EPA regulations (40 CFR 105) and recommendations in the *Public Participation Handbook for Water Quality Management*. These set the public participation rules which EPA and your 208 agency will follow.

Public participation requirements and some of the more important suggestions contained in the EPA handbook are as follows:

- The public should have continued access to informational materials. These should be available at the earliest opportunity, conveniently located, and accessible on evenings and weekends.
- Assistance in understanding and participating in the planning process should be available to the public. This means allocating technical staff time to respond to special citizen needs.
- Citizens should be consulted on all important planning decisions, while their views can still affect the decision. They

should not merely be kept informed, they should be involved in actual decision-making.

- A regular newsletter or bulletin should be mailed to all interested citizens. It should contain meaningful information on what is going on in the planning process.
- Public hearings alone do not consititute a complete public involvement program and should not be considered as such. They are merely a formal opportunity for citizens to be heard and comprise only one element in a complete program. Hearings should be well publicized and conveniently scheduled and located.
- Regulations require a Policy Advisory Committee. (This is discussed below under "Formal Requirements.") This committee by itself does not adequately meet the requirement for public participation; additional citizen advisory committees should be established.
- 208 agencies should provide adequate funds for public participation. EPA recommends that 10 percent of an agency's total planning budget be devoted to public participation.

CITIZEN ACTION:

Obtain a copy of EPA Public Participation Regulations (40 CFR 105) and the handbook mentioned above. Although not all of the ideas in the handbook are mandatory, it does set forth some good goals for your 208 agency's public participation program. You have a right to expect your agency to meet those goals. If you believe your agency's public participation program does not meet the letter and the spirit of the regulations and handbook, ask that changes be made. Be as specific in your requests as possible. If your agency is not cooperative, ask for help from EPA. It is important to resolve public participation issues as soon as possible, so that you can focus on developing effective pollution control programs.

Formal Public Involvement

There are several formal avenues for citizen participation in 208 planning. These include (A) the Policy Advisory Committee, (B) the Citizen's Advisory Committee, (C) the Technical Advisory Committee, (D) the 208 agency's citizen outreach program, (E) and the public hearing on the plan.

A. Policy Advisory Committee

A Policy Advisory Committee (PAC) is required by EPA regulation for each state and areawide agency. The PAC should review all documents prepared by the planning agency and should provide advice on broad policy matters, including the fiscal, economic, and social impacts on the plan.

The PAC will be organized and its membership selected by your 208 agency. Areawide PAC's must include representatives of the state and the general public. State PAC's must include a majority of elected officials unless a lesser percentage is approved by EPA. The EPA Public Participation Handbook recommends that membership on both state and areawide PAC's reflect a balance of the varying interest in the community, including environmentalists and representatives of the public interest. Committees can be of any size.

Meetings of the PAC and other advisory committees should be open to the public and there should be opportunity for individuals who are not committee members to participate.

CITIZEN ACTION

1. Ask your state agency in charge of the water quality management program if it is still possible for members of your group to join the committee. The state committees may still not be set up in many states. If you live in a designated area, it may be worthwhile to ask your designated planning agency. However, committee members should have been chosen by this time.

2. Ask the staff of the state or areawide agency for a list of committee members to determine if there are sufficient public interest representatives. If not, write to the state or areawide water quality management agency project director, to the governor, to your representative in Congress and to the EPA regional office to urge that a broader representation be required on the committee.

3. Go to the meetings and ask questions about things you do not understand or

feel have not been included in the program. Make sure there is a method for asking questions at the meeting.

4. Determine what sort of authority the PAC has been given. It should have the opportunity to review and comment on all documents and recommendations.

B. Citizen Advisory Committee

A Citizen Advisory Committee (CAC) is not required but the EPA Public Participation Hand book recommends that one be established and most agencies have done so. The CAC is the only formal participatory mechanism for citizens who are neither technical experts nor elected officials. Without such a formal mechanism it is difficult to see how the public participation requirement of Section 101(e) can be met and therefore one should be established.

The CAC should be organized very early in the planning process and should be consulted on all major planning decisions. These may include selection of contractors and consultants; identification of polluting activities; recommendations for land use strategies; selection of BMP's, regulatory programs, and management agencies; and others. The CAC can establish subcommittees to recommend BMP's for each nonpoint source pollution problem.

At least one EPA region has recommended that the CAC be formally consulted on all planning decisions. This is essential if the CAC is to be more than a paper response to the Clean Water Act's public participation mandate. Only through a formal consultation requirement can the CAC be assured of a role in 208 decision-making.

CITIZEN ACTION

1. Be sure that your views are well represented on the CAC. Ask to be a member yourself or suggest someone whom you know will represent you well. Be aggressive in supporting yourself or your selection by obtaining letters of recommendation from citizens and elected leaders.

2. Ask the CAC to establish subcommittees to recommend BMP's for nonpoint source pollution problems. The CAC may decide to include as members of subcommittees individuals who are not on the CAC itself.

3. Ask your state and/or designated agency for a copy of the committee budget. Urge that the committees have budget and

staff support sufficient to carry out a citizen participation program. Between 8 and 10 percent of the total budget for the Water Quality Management program should be available for citizen participation.

4. Urge the committee to comment separately on any important issues in the Section 208 program.

C. Technical Advisory Committee

Technical Advisory Committees (TAC's) have been established by planning agencies to give general technical advice or to focus on specific problems such as agriculture or forestry. There are no specific membership requirements for TAC's, but they usually include personnel from state, municipal, and/or federal agencies; faculty members from local universities; representatives of private interest groups, such as the timber industry; and others with expertise in a special problem area. Representatives of the public and of environmental groups should be included in the membership of these committees. Committee meetings should be open to the public.

CITIZEN ACTION

1. Urge your state or areawide agency to include members of the public on the TAC. Persuade your agency to publish a newsletter or similar kind of communication to report on technical issues related to specific problems and their solutions.

2. Urge the agency to set up committees of technical experts and affected persons to develop solutions to specific point source and nonpoint source problems which have been identified in your state or area.

D. Citizen Outreach Program

Every 208 agency must inform the public of its plans, activities, and accomplishments. The agency should also provide information on characteristics of the planning area, pollution problems, and technical questions which will influence the final plan. The public should also receive prompt notification of important events such as hearings, meetings, and completion of important studies.

The agency s outreach program should include at minimum:

- A commitment by the project director to plan the agency's activities and allocate staff time in such a manner as to encourage public involvement.
- A full-time public participation coordinator.
- An adequate budget for public participation. The EPA Public Participation Handbook recommends that 10 percent of the total project budget be allocated to public participation measures.
- A regular newsletter mailed to all interested parties.
- Community meetings to inform the public on planning progress and to hear the public's views.

The public participation coordinator should not be the only agency representative to have contact with citizens, other staff should be accessible as well. The public participation coordinator should help arrange these meetings between the staff and the public.

The newsletter should provide information on agency plans and important decisions and provide citizens with technical information. It should reflect the planning process as it is; points of disagreement should be raised for full discussion—not glossed over. A number of 208 agencies have published excellent newsletters with effective but inexpensive formats. (Sample newsletters should be available from EPA.) Information can be provided in many additional ways: radio and T.V. spots; speakers for meetings of civic, environmental, and professional groups; and others. For example, the Regional Planning Council of Pueblo County, Colorado inserted flyers into the water bills sent to area residents explaining briefly the local water quality management program. The flyer included a section which the resident could fill out and return that gave his/her name and address for a water quality information mailing list. Other public information/communication techniques are suggested in the EPA Public Participation Handbook.

All citizens should be aware that agencies have the option to carry out many of their responsibilities by contract. This includes

the agency's public participation responsibilities. In at least one case, the state of Rhode Island, an agency has contracted with an environmental group to carry out its citizen involvement program. Reports from many sources indicate that the group, Ecology Action of Rhode Island, has performed its contractual responsibilities in an outstanding manner. This appears to be a sound approach and one which every agency should consider seriously. Citizens groups are familiar with the locality, have credibility and communication networks, and can frequently provide information and feedback effectively and at low cost.

CITIZEN ACTION

Ask your 208 agency to consider proposals from public interest groups to conduct the public participation program. Submit a proposal on behalf of your group.

E. Public Hearing

A public hearing is recommended before a 208 plan is submitted to the governor for approval. If citizens request a hearing one must be held. Hearings should be conveniently scheduled and located, and the draft plan should be available for public review enough in advance of the hearing to allow it to be studied carefully. At the hearing the agency staff should explain the plan and be available to answer questions. The agency should be asked to go on record concerning the plan: Does the staff think it will lead to attainment of Water Quality Standards? Is it feasible? Do management agencies have adequate funding? Do they have adequate staff? Are proposed non-regulatory programs *really* likely to do the job or is a regulatory program needed? etc.

The hearing can serve several important functions for the public. It is a formal opportunity for citizens to comment on the plan and the planning process. If the plan, or parts of it, deserve support, citizens can show that support by positive testimony at the hearings and by turning out in large numbers to demonstrate their approval. Legal and technical experts who have been helping citizens should also be asked to put their remarks on the record. If some alternatives, solutions, or management agencies appear inadequate, citizens can take the opportunity to oppose their inclusion in the final plan.

Citizen opinions will help the governor and EPA as they make their decision on the plan. Realistically, the chances of stimulating major changes in the plan between the time of the hearings and its submission to the governor are not great. However, a formal record of support or opposition can be established which can be influential. Objections raised in it must be answered, and the record is passed on to EPA and used in EPA's review of the plan. Sincere expressions of individual and community concern for clean water and the environment as a whole will be persuasive and should be a part of the hearing. However, the governor and EPA will make a decision to approve, approve with conditions, or disapprove the plan on the basis of specific criteria defined by the law and regulations. Therefore your comments should focus on as many of the following important legal and technical issues as possible:

- Was there public involvement in all important decisions made in the course of preparing the plan?
- Were solutions developed for all serious pollution problems?
- Was the technical methodology sound?
- Are all needs for new laws stated? Have such laws been passed? If not, how will they be passed?
- Will the plan lead to attainment of Water Quality Standards?
- Are Water Quality Standards high enough?
- Are specific control programs recommended?
- Are regulatory programs included?
- Are management agencies identified for each portion of the plan and are they capable of carrying out their assigned responsibilities?
- If a plan is inadequate, what can be done to make it adequate?
- What conditions should be placed on approval?
- Should the state adopt the plan?

Remember, public hearings are also media events. Make sure that your case is well reported in the media. This could

mean a press release, fact sheet, press conference, demonstration, signs, banners, etc. It may also mean winning the "numbers game" – turning out more people who support your position than your opponents can. Be creative. Don't let your creativity be inhibited by the pseudoformal atmosphere of the hearing. Check any hearing rules which the 208 agency may have set. If what you have in mind isn't specifically prohibited, do it.

CITIZEN ACTION

1. Citizen groups and citizen group members of the Policy Advisory Committee and the Citizens Advisory Committee should try to have as many people as possible come to the public hearings.

2. Insist that public hearings include a discussion of alternatives and new directions for the public to consider; the hearing should not be simply a presentation of technical information. Insist that the technical information which is presented be linked to proposed management alternatives.

Actors – Who Will Influence 208 Plans?

A. Elected Leaders

208 plans are likely to be profoundly influenced by the attitudes of local and state elected officials. Elected leaders will balance the needs of water pollution control against other, and sometimes conflicting demands which are made on them or which they anticipate. For example, a program to control erosion from construction sites might require approval of an erosion control plan before a building permit is granted. Past history shows that many building contractors will strongly oppose this requirement and will make their opposition known to elected officials. If those officials are not committed to pollution control they may not be willing to pass the legislation needed to make erosion control mandatory. Or, they may enact the program but fail to provide adequate staff and budget for inspections and enforcement.

Even with the best intentions and a new willingness to pressure states and localities, EPA is limited in its capability to compel a state or local area to plan properly. Therefore, it is very important that citizens working at the local level recognize the discretion that local officials have over water pollution control planning. Citizens must impress upon local officials in every way possible the importance of clean water and indicate that local people are willing and anxious to do whatever needs to be done to have clean water. This includes:

- Making water quality planning an issue in election campaigns by using candidate questionnaires, holding candidate nights and supporting candidates who are concerned about water quality.
- Lobbying in favor of proposed ordinances and other measures which are important to clean up the water.
- Visiting elected leaders alone or in groups to explain important issues, emphasize the importance of water pollution control, and urge their cooperation.
- Arranging for your local government to pass a resolution expressing support for 208 planning.
- Generating letter writing or telephone campaigns directed toward elected leaders at important decision points in the 208 process.
- Making water pollution control an agenda item at meetings of civic associations and other community and statewide groups and inviting elected officials to participate so they can observe citizen concern about water problems.

The utilization of political action techniques is essential to the success of 208 planning. Several sources of ideas on how citizens can influence political decision-making are:

- *How to Hold a Citizens Hearing*, A Public Action Manual, Donald K. Ross, Public Interest Research Group, 419 A Dupont Circle Building, Washington, D.C. 20036.
- *How to Plan Action*, Midwest Academy, 600 West Fullerton, Chicago, Illinois 60614.
- *How to Plan a Media Event*, Mass PIRG, 120 Boylston Street, #320, Boston, Massachusetts 02116.
- *The Sierra Club Political Handbook*, Sierra Club, 1050 Melb Tower, San Francisco, California 94104.

• *Common Cause Action Manual*, Common Cause, 2030 M Street, N.W., Washington, D.C. 20036.

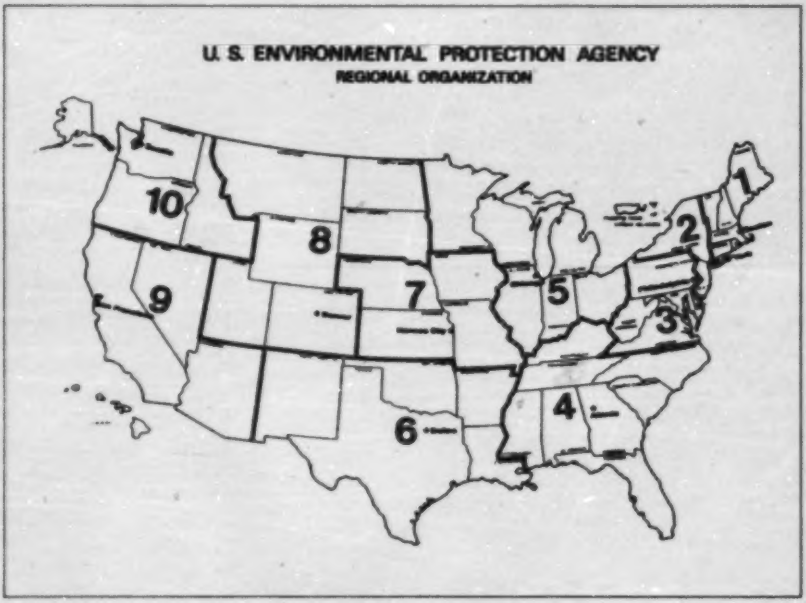
B. 208 Agency Staff

In the course of developing the 208 plan agency staff will certainly become aware of the positions that elected officials hold on pollution control. If elected officials support 208, fine, but if they don't support it as much as you do, this can have an inhibiting effect on 208 planners—especially as they begin to develop alternatives and make recommendations. Citizens should make their support for 208 planning known to agency staff and also let them know that citizens are counting on them for a fair, professional, and complete implementation of the planning requirements. This may carry more weight if citizens know the planning requirements and let the staff know that they know the requirements.

As you develop a relationship with agency staff, try to determine how they stand, as a group and as individuals, on 208 and water pollution control. Many agency staff are concerned about the environment and justifiably believe they are improving it through their work in 208 planning. Citizens who have long contended with the problems of water pollution control are often frustrated by their dealings with the establishment and, lacking a more appropriate target, may project this hostility onto the agency staff. Doing this may cost key allies.

C. EPA Personnel

EPA personnel are responsible for seeing that 208 is properly carried out. Citizens should regard EPA personnel as a resource for advice and information and as an appeal mechanism to use if their 208 agency is not preparing its plan according to EPA regulations. If something is going wrong in your planning area—control programs not being developed; issues being swept under the rug; formal public participation being carried out in a half-hearted, ineffective manner—let EPA personnel know and ask for their help. Ask them to come to your area personnally and straighten things out. When you contact them, be sure to give them all the relevant information and be



accurate. They will appreciate this; often contacts with citizens are their best source of information on what is going on in the planning areas. Several EPA "positions" could become key contacts in your efforts:

- The 208 project officer. This is the EPA person directly responsible for your 208 plan. The project officer is located in an EPA regional office. If you don't know the project officer's name, just write to the EPA Regional Office and address the letter to the Project Officer for your 208 plan.
- The Regional Public Participation Coordinator. The coordinator, also in the regional office, is responsible for seeing that the public participation requirements of the Act are met, but can also help on any other 208 problem. Send the coordinator copies of any letters you send to the regional office.
- The Regional Administrator. This is the top person in the regional office. The Regional Administrator is responsible to EPA Headquarters in Washington – but actually has a lot of latitude for action. If other EPA personnel have not been helpful enough contact the Regional Administrator for help.
- EPA Water Planning Division, Washington, D.C. The people of this office are responsible for the whole 208 planning program. If you are still not satisfied after contacting the regions, contact the Water Planning Division. It may be a good idea to send them copies of any letters you send to the Regional Office.
- The EPA Administrator, Washington, D.C. The Administrator is the head of EPA and your last resort short of a court suit. If you are in a real struggle and you think the EPA folks lower down aren't giving you the support the law requires, contact the Administrator. He or she may just help you out – it's happened before!!

D. Local Experts

Many of the battles over 208 will be fought over information or interpretations of information. Many different specialists (engineers, biologists, toxicologists, professors of business, and others) have expertise which they can bring to bear on 208 planning. The more expert help you get, the sounder and more effective your positions will be. Local or state colleges and universities are often good sources of people willing to help.

E. Your Representative or Senator

Congress wrote Section 208 and is very interested in its progress. If your agency is not carrying out 208 as you think it should, do not hesitate to ask your Congressperson help straighten things out. (This may be the most effective way to get EPA help, too.) Not all Congresspeople are favorably impressed with 208, so this might turn out to be a dead-end street. It is worth a try, however. The more Congresspeople hear about how much their constituents like 208, the more they will support the program.

F. Others

The list of potential allies found above is not complete. Other prospects include state agencies, local planning and regulatory agencies, local service clubs, labor unions, affected industries, and many more. Don't forget national groups, such as the National Wildlife Federation and the Natural Resources Defense Council, which may be able to give helpful advice. For an extensive list of groups (private, public, and government) that may be valuable sources of information and assistance see the *Conservation Directory*, published annually by the National Wildlife Federation, 1412 16th Street, N.W., Washington, D.C. 20036, $3.00.

Establishing Specific Control Programs

Chapter III, and the initial paragraphs of this chapter, have emphasized the importance of developing control programs for each pollution source or polluting activity identified by 208 plans. To assist citizens in encouraging their 208 agency to develop effective water pollution control programs, we have prepared a list of questions which should help illuminate your

agency's progress in developing control programs for nonpoint source pollution.

Interspersed among these questions are some suggestions for citizen action and summary information on 208 requirements. Your knowledge of 208 planning, plus information on each pollution problem which is found in Chapter V, plus your common sense should allow you to evaluate your agency's answers and develop a valid impression of the strengths and weaknesses of their planning effort for each nonpoint source pollution problem. Do not be reluctant to approach your agency with questions. It is part of their public participation responsibilities to respond to citizen inquiries. Silviculture is the specific problem mentioned in the list below, but this is only an example. The questions apply to other nonpoint source pollution problems as well:

1. *Priorities.* Is silviculture listed as a priority by your 208 agency? If not, do your experience and knowledge of the planning area tell you that the agency is correct in determining that silviculture is not a priority problem? Let your agency know if you disagree with its decision and ask that it be changed.

2. *Best Management Practices.* Is the agency developing Best Management Practices which will control nonpoint pollution from silviculture? If not, it should be. Has the agency established a Best Management Practices Committee (or subcommittee of the TAC or PAC) to assist in developing BMP's for silvicultural activities? If not, ask the agency, the PAC, or the TAC to establish such a committee. It should have open meetings and include environmentalists and representatives of the general public as well as representatives of regulatory agencies and economic interests.

3. *Legal Framework for Control Programs.* Every effort should be made to incorporate existing statutes and ordinances into each program. Is the agency examining existing laws that may apply to pollution from silviculture? Can the BMP's proposed be carried out under existing law or are new laws needed? Where new laws are needed, has the agency drafted them? Have they been passed? If not, has the agency developed a plan and schedule to see that they will be passed?

4. *Management Agencies.* Your agency must recommend a management agency to carry out the program to control pollution from silviculture. Has it done so? Has it identified the legal authorities needed by the management agency to carry out the program? Are these authorities adequate or should others be recommended also? Does the management agency already have the recommended authorities or are new authorities needed? Has your 208 agency drafted legislation to provide the new authorities? Has it passed? What has the 208 agency done to encourage passage?

5. *Regulatory Programs.* Is the agency proposing a regulatory or a non-regulatory program to carry out BMP's for silviculture? If a regulatory approach is proposed, has the agency considered all the possible regulatory tools—permits, inspections, bonds, fines, and others identified in Chapter III—and selected the best ones for the job? If not, propose improvements to the program the agency has developed. Is there a schedule for carrying out the program? If not, there should be.

6. *Non-regulatory Programs.* If your agency is proposing a non-regulatory program, does it meet the criteria for non-regulatory programs listed in Chapter III? EPA will not approve a non-regulatory program if a regulatory program is now authorized or if the non-regulatory program merely continues an existing ineffective effort. Also, a non-regulatory program will not be approved unless there is assurance that it will lead to the attainment of water quality standards, including the antidegradation policy. Do you agree that the proposed non-regulatory program will do this? If not, let the 208 agency and EPA know that you don't think a non-regulatory program will work. Has your agency proposed adequate monitoring to let you know if a non-regulatory program is working or not? If not, such a monitoring program must be developed—it is required for all non-regulatory programs.

7. *Management Agency Staff.* Did the 208 agency determine the types and number of personnel the management agency needs

to carry out the silvicultural pollution control program? If not, this should be done. The 208 agency should also state whether the management agency already has the necessary staff or if it needs to expand. If expansion is required, the 208 agency should provide plans and a schedule for the expansion.

8. *Management Agency Budget.* Has the 208 agency identified ways for the management agency to get the funding which it needs to carry out the control program for silvicultural activities? Are these means realistic? Are there other means which should have been considered?

CITIZEN ACTION

These questions are valid for any nonpoint source problem covered by 208 planning. Information on each of the problems and activities which come under 208 planning if found in Chapter V. This information should help you frame your questions and evaluate the agency's answers. If you are not satisfied with your agency's answers to the questions posed above or with its performance on any particular problem, you should pursue changes. Remember to use the formal advisory committee structure and technical arguments to the fullest, but do not forget that many 208 planning decisions, especially those surrounding the establishment and funding of control programs, will be strongly influenced by the general political climate of support for clean water in your state or area. Be sure to involve EPA if you believe your agency is not abiding by the 208 regulations.

V Programs to Prevent Pollution

This chapter will discuss each of the potential pollution sources and activities which 208 planning must address and the development of a program to control that pollution. In most cases, each of the eleven sections of the chapter will include information on the nature or severity of the problem, some of the types of data which must be collected to develop solutions, a sample of Best Management Practices which have been used successfully elsewhere or which might be appropriate to solve the problem in your area, identification of issues which should be considered in the development of regulatory programs and selection of management agencies.

A profile of the major problems which your agency has identified and the agency's schedule for developing solutions can be obtained from the Water Planning Division (WH-554), EPA, 401 M Street, S.W., Washington, D.C. 20460.

In developing a strategy to participate in 208 planning and to address each pollution problem in your area, you should refer to the questions in the section on *Establishing Specific Control Programs* which concludes Chapter IV. The questions in that section are valid for all nonpoint source pollution problems. Additional questions or suggestions which apply to specific problems are included at the end of each section of this chapter.

Waste Treatment Facilities

Introduction

208 plans should influence the location and size of municipal waste treatment facilities and sewer lines. From the perspective of many citizens, this is perhaps the most important function of 208 planning, because sewer facilities are probably the single

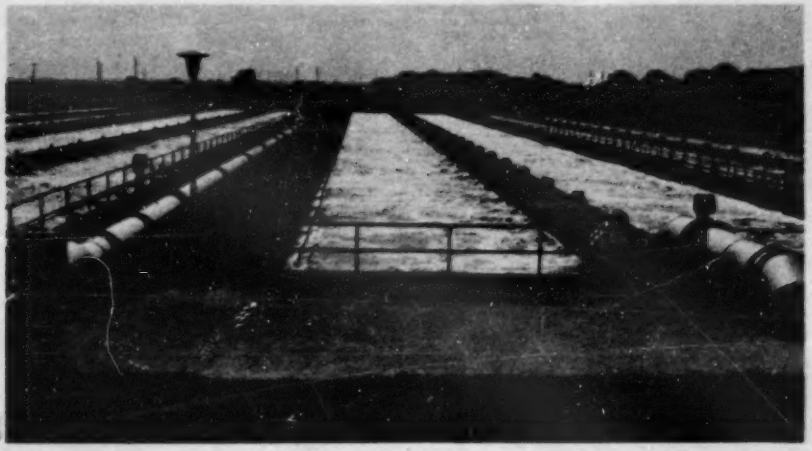
factor with the greatest influence on when, where, and how fast a community will grow. Decisions about the placement and size of sewage treatment facilities will affect land values, create pressure for rezoning, and are likely to force decisions about schools, parks, libraries, and other public facilities. In the process, the character of a community can be totally altered—rural communities may find themselves becoming suburbs; suburbs may suddenly begin to sprout high-rise development. In many cases the growth is accompanied by significant tax increases.

208 offers an opportunity to anticipate these changes, learn what the alternatives are, assess their desireability, and plan for the alternative that the community prefers. This will be done primarily by establishing general criteria for sewage treatment construction which will be consistent with the community's other plans for its future. This should put an end to situations in which plans for the sewer system proceed independently of other plans and lead to development which conflicts with those plans.

Preparation of detailed plans for sewage treatment facilities is not part of the 208 planning process. Such plans are developed under a separate Clean Water Act planning program known as 201 planning or facilities planning. Once 208 plans have set general criteria for municipal sewage treatment systems, 201 plans must abide by them. 201 planning got off to a rapid start immediately after the Clean Water Act was passed in 1972. EPA saw the planning and construction of municipal sewage treatment plants as a rapid way to accomplish some pollution cleanup; Congress appropriated $18 billion for this purpose, and states and municipalities were anxious to spend that money. 208 planning received much less emphasis and began much more slowly.

The thrust of the 201 program has been the rapid construction of large centralized treatment facilities. EPA now acknowledges that this has resulted in a number of facilities which are much larger than needed, which have spurred unplanned growth, and which have virtually bankrupted the communities which have to pay for them. The rapid progress of 201 planning has undercut the effectiveness of 208, because many decisions which should fall under 208 were made by 201 plans. Where treatment plant construction has already begun on the basis of these decisions, it is too late for 208 plans to undo the damage. Nevertheless, in many areas it is not too late for 208 plans to significantly influence 201 planning. Congress originally intended 208 to guide 201 planning, not the reverse. The public can play an important role in seeing that 208 comes first in the future.

Municipal Sewage Treatment Plant



EPA

The Program for Wastewater Treatment Facilities

208 planning requirements for municipal waste treatment facilities are quite specific, and require the following:

- An estimate of facilities needed to treat industrial and municipal wastewater over the next 20 years.
- A process to update the wastewater treatment needs inventory every year.
- An analysis of alternative waste treatment systems including land required.
- An estimate of the wastewater and stormwater collection system that will be needed.
- A description of a program to finance the needed treatment facilities.
- A list of priorities and time schedules for construction of treatment facilities.
- A program to regulate the location, modification, and construction of any facilities in the planning area which may discharge pollutants to the water.

1. Technical Data

Population and employment projections are probably the single most important determinant of sewage treatment plant size and the location of sewer lines. If these projections are too high, they will lead to the construction of treatment plants which are larger than necessary. This "excess capacity" has frequently stimulated unplanned and unwanted growth and development. Your 208 agency should develop reliable projections. The most reliable national and statewide population projections are provided by the Office of Business Economics, U.S. Department of Commerce (OBERS). New OBERS projections have just been prepared for EPA and will be issued in late 1977. They should be the population estimates used by your 208 agency.

Another important factor in determining future waste treatment needs is the volume of wastewater that each person is assumed to generate each day. Standard engineering practice is to assume 100 gallons per person per day, but many systems are designed for 125 gallons per person, and some for much more. Actual flow generated in small rural communities is 50 gallons or less. For more affluent suburban communities the flow is 60 gallons per day. Designating systems for 100 gallons or more leads to excess capacity. Your 208 agency should determine actual patterns of wastewater generation per capita, consider any future reductions which can be achieved by conservation practices, and then use that estimate to project future waste treatment needs.

The plan should also include information on which parts of the planning area should be sewered and which should not and an inventory of critical environmental areas such as floodplains and wetlands which should be off limits to development. Where sewer expansions are planned, the 208 plan should provide a list of priorities and schedule for construction.

2. Regulatory Programs

An effective regulatory program for municipal waste treatment will include certain key elements:

- Definition of the public wastewater collection and treatment system needs, in 5-year increments over at least a 20-year period. This should include an analysis of alternative waste treatment systems, requirements for and general availability of land for waste treatment facilities and land treatment and disposal systems, total capital funding required for construction, and a program to provide the necessary financial arrangements for the development of such systems.
- A program to raise funds for adequate operation and maintenance of treatment facilities. Data developed by the General Accounting Office and EPA show that as many as half of existing municipal facilities are not well maintained and as a result are not treating wastewater as they were designed to do. Poor operation and maintenance are often a consequence of inadequate budgets for personnel, equipment, and chemicals.
- A program for construction of treatment facilities (especially collections systems) so that the most-needed portions are completed first ("phased construction").
- Mechanisms to prevent construction of sewage facilities which will conflict with effective land use planning, such as facilities which would generate development

in floodplains or lead to sewering of areas which should be served by on-site systems.
- Provisions to allow new dischargers into the system and arbitrate between claimants for the right to discharge when available treatment capacity is limited.
- Prohibitions against allowing a system to accept more wastewater than it can treat to the required level of purity.

The last two capabilities may require sewer allocation policies and sewer moratoria. Sewer moratoria may exceed the authority of most management agencies even if a treatment plant is already violating its NPDES permit. Recent court decisions have held that sewer moratoria can only be established if public health is threatened, if existing treatment capacity is inadequate, and if the moratoria have time limits. Courts often require accurate capacity figures and reasonable provision to allow exceptions to the regulations before establishing the moratoria.

Several municipalities have addressed the issue of phased construction of treatment facilities and pipes by what is known as an adequate public facilities ordinance. This type of law ties public funding of sewers to the existence of other public facilities such as schools, parks, and roads. Areas which do not have a minimum standard of public facilities will not be provided with sewers at public expense. This is often associated with a phased development concept in which close-in areas are developed first. Under this concept development radiates from an existing development area rather than "leapfrogging" over large open space areas, to develop areas far from existing urban centers.

3. Designating Management Agencies

The different kinds of authority which will be needed by a management agency are listed in Section 208 of the Clean Water Act. All of these must be held by one agency or a combination of agencies linked by enforceable interagency agreements. They include authority to manage waste treatment works, design and construct new waste treatment works, accept and utilize grants and other funds, raise revenues, incur indebtedness, ensure each participating community pays its share of the costs, refuse to accept wastes from areas which do not comply with the 208 plan, and accept industrial wastes for treatment. Additional authority may be implied by requirements of the regulatory program. The requirements should be checked against the management agency authority to be sure that the agency has all the authority needed to carry out its program.

EPA Documerica

Municipal Sewage Treatment Plant Effluent Being Discharged To A Stream

Sewage treatment facility service areas do not always coincide with political boundaries, so it is essential that the management agency be able to enforce the sewer program throughout the entire area, even if several political jurisdictions are involved. At the same time, it is important to beware of developing a "super-agency" which can override local decisions and install sewers in contravention of local land use preferences. Again, lack of personnel and funding for operation and maintenance of treatment facilities is a common problem. Your 208 plan should state what level of funding and staffing is needed for the management agency. It is vital to be sure that the agency has the funding needed.

4. Municipal Wastewater Treatment Programs and Urban Runoff Problems

A later section of this chapter addresses nonpoint source pollution caused by stormwater runoff. It is important to understand that there is a direct relationship between the municipal waste treatment program and the urban stormwater control program. Waste treatment facilities affect both the rate and the location of growth and development. Wherever growth occurs, stormwater runoff will increase because of construction, disruption of natural drainage patterns, and the increase of impervious surface (driveways, roofs, parking lots, etc.) which prevents rainwater from soaking into the ground. If sewage systems are extended into an area which does not have a program of runoff control and prevention, the runoff which results when the area is developed may seriously pollute surface water bodies in that area. Except in emergency situations, new sewage facilities should not be extended into areas which lack runoff control programs.

CITIZEN ACTION

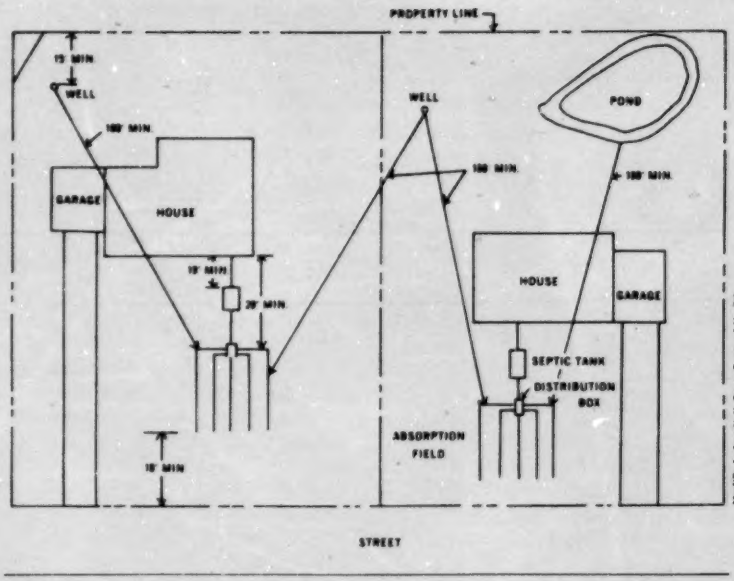
1. Obtain a copy of *Land Use and the Pipe*, by Tabor, Shapiro and Rogers (Lexington Books, 1976). It explains sanitary engineering practices in terms the layperson can understand, and discusses the growth-generating characteristic of sewage treatment plants and pipes and the art of population projection.
2. Ask your agency if it is using the OBERS projections. Ask how the projections will be broken down ("disaggregated") for each political jurisdiction in the planning area. Ask for public meetings and hearings on the disaggregation of these estimates.
3. Ask your agency if your area has legal authority to tie sewer availability to population growth. If not, ask that such authority be developed.
4. Several pamphlets available free from the EPA Office of Public Affairs, Washington, D.C., 20460, provide useful information on sewage treatment methods and the facilities planning program. These pamphlets are incomplete, however, in that they do not emphasize that public participation is an important requirement of the facilities planning process. These publications are: *Building for Clean Water, All You Need to Know About Sewage Treatment Construction Grants, Making Your Wastewater Treatment Plant Work, The Public and Construction Grants, and A Primer on Waste-water Treatment.*
5. Be sure that your 208 agency includes nonpoint source pollution from all growth and development associated with new treatment plants in its nonpoint source assessment.
6. Urge your 208 agency to propose the prohibition of new sewer lines in areas which are not covered by nonpoint source pollution control programs.

Septic Tank Systems and On-Site Treatment

Introduction

Wastewater from homes can be treated in large, centralized treatment facilities, or it can be treated and disposed of on the site or lot where a home is located. Many types of small, onsite wastewater treatment systems are now sold including composting toilets, oil flush toilets, incinerating toilets, biological and chemical toilets, evapotransperation beds, and septic tank systems. While there are reports of satisfactory performance by all of these systems, probably the familiar septic tank system is the only one likely to be widely used in the near future.

Septic systems consist of an underground holding tank into which household wastewater drains and underground perforated pipes surrounded by stones and covered with soil called a leaching field or absorption field. Some wastes separate from the liquid by settling to the bottom of the holding tank where they are partially decomposed by anerobic bacteria. The remaining liquid flows from the tank through the pipes and into the soil of the leaching field. Biological wastes are decomposed by microorganisms in the soil and nutrients are absorbed by the root systems of growing plants. In a properly operating system these three processes--settling of solids, biological



The diagram shows septic tank and leaching field locations in relation to wells and surface water. Note set back requirements.

decomposition, and nutrient uptake--will remove most pollutants from the wastewater before it seeps into ground or surface waters.

In many communities, workable septic systems are being replaced by centralized sewage treatment systems. Recent surveys by EPA and state agencies have found that many small towns and sparsely populated areas would save considerable amounts of money by keeping their septic systems rather than building sewers and sewage treatment plants. Compared to properly functioning septic systems, sewers and treatment plants are costly and stimulate growth.

Septic systems can be permanent solutions to residential sewage disposal. Septic system failures are frequently the result of human error—poor design, improper installation, or poor maintenance. Properly designed and cared-for septic systems can provide a relatively inexpensive, environmentally sound, long-term method of treating household waste. They do not provide a strong stimulus to growth as do sewered systems.

Issues in Septic System Management

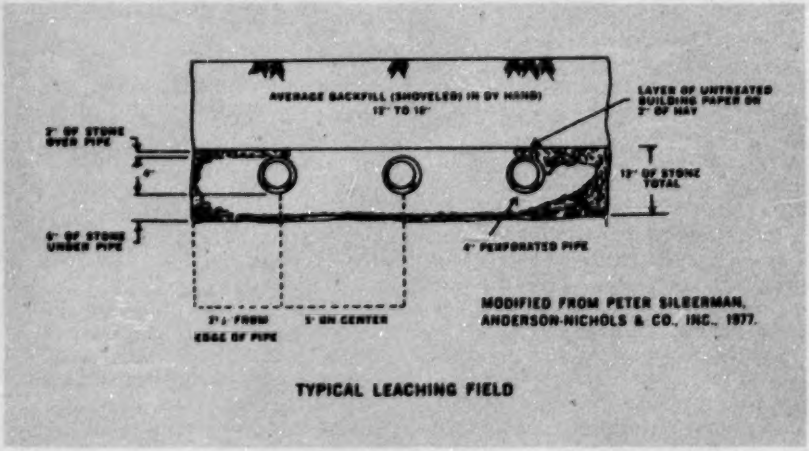
1. *Siting.* The standard method of determining where septic tanks should be located is the "perc (percolation) test". Water is poured into a hole in the ground to see if it will drain at a suitable rate (neither too fast nor too slow) to accept wastewater. Although this test is given all over the country, it is generally considered unreliable. It can be improved by coupling it with a minimum lot size requirement (usually at least one acre even with the best soils), an analysis of the type of soil on the site by a competent soil scientist, and a conscientious

effort by the county or municipal sanitary office to encourage good design, installation, and maintenance. Some areas such as those near watercourses or with shallow or sandy soils should be designated off limits to conventional septic tank systems.

2. *Design*. Criteria vary from state to state and according to the volume of the system. A four bedroom house with a washing machine and a dishwasher requires a larger leaching field than a two bedroom house without major water using appliances. Some rules of thumb are: keep systems a minimum of 50 feet from surface water bodies, and 100 feet from wells, require at least 48 inches from the bottom of the leaching field to the ground water (although some states allow only 18 inches). A system that has been successful in Fairfax County, Virginia is to require two leaching fields, each one used in alternating years while the other rests and rehabilitates itself.

3. *Installation*: Well designed systems may fail if contractors or homebuilders do not install them properly. Leaching fields should be installed in a single day and in dry weather. If installation requires more than one day partially completed fields should be covered to prevent filling with rainwater. Every effort must be made to prevent soil in the leaching field from being packed down. Compacted soil impedes the flow of wastewater into the field. Compacting can be avoided by filling leaching field trenches by hand, rather than machine. Heavy equipment must be kept off of the leaching field area because it can compact soil and crush the pipe which transports the wastewater into the field. Crushed stone is usually a part of the leaching field drainage system. Care should be taken not to use clay covered stone because the clay will eventually be washed to the bottom of the field, seal it, and prevent drainage.

4. *Maintenance*: Much of the responsibility for maintenance must fall on the homeowners. Septic systems will fill more rapidly if they are used for disposal of kitchen wastes and other large solids. Water conservation helps performance too--both by reducing the volume of liquid to be absorbed by the leaching field and by allowing more time for solids to settle out in the tank. Ideally septic tanks would be inspected every year and pumped if necessary. Pumping septic tanks every two to three years is absolutely necessary for good operations. Some municipalities automatically pump tanks every two years; some simply remind the homeowner, by post card, when it is time to pump. In Fairfax County, Virginia, all septic systems must have permits which are renewed every two years. No renewal is allowed unless the homeowner presents evidence that the tank has been pumped. Towns and municipalities can encourage good maintenance by distributing a homeowners manual on septic system care.


AVERAGE BACKFILL (SHOVELED) IN BY HAND
12" TO 18"
LAYER OF UNTREATED BUILDING PAPER OR 2" OF HAY
12" OF STONE TOTAL
4" PERFORATED PIPE
MODIFIED FROM PETER SILBERMAN, ANDERSON-NICHOLS & CO., INC., 1977.

TYPICAL LEACHING FIELD

5. *Septage*. There must be a means to dispose of septage (sludge pumped from the bottom of septic tanks). One possibility is an existing sewage treatment plant. This requires a plant that can accept and treat septage in the volumes and on the schedule that meet septic system user needs. An alternative is a special plant to treat septage. Construction of such a plant is eligible for 75 percent federal funding. Several towns could cooperate to construct and operate one such plant. Vehicles which pump and haul septage ("honey wagons") are also eligible for75 percent funding.

Serious consideration should be given to disposal by land spreading. Septage is well suited for this because it has value as fertilizer and, unlike the wastes from many municipal treatment plants, is relatively free of toxic substances and heavy metals. Before land spreading, the septage must be dewatered by composting or other means.

6. *Rehabilitating Failed Systems*. Recent data suggest that flushing with hydrogen peroxide is an effective way of clearing clogged leaching fields so they will function properly again. A second is to construct a new on-site leaching field, allowing the old field to rest and renovate itself through natural processes. Once the old field is renovated, the system is operated with alternating fields as discussed above. A third way is to abandon the on-site leaching field in favor of new community leaching fields to which several units may be connected. This is a relatively recent innovation called a cluster septic system. Usually each unit has a septic tank on-site for the deposit of solids. Only the liquid portion of the wastes are transported to the community leaching field. The on-site tanks require pumping every two or three years.

7. *Regulatory Programs and Management Agency*. A permit program is an effective means of maintaining septic tanks as a sound, long-term means of wastewater treatment. Permits should cover the issues discussed in preceeding sections: siting, design, installation, annual inspection, and pumping. Personnel in key roles—designers, builders, inspectors, and honey wagon operators—should be trained and licensed. Licenses should be suspended for failure to follow good septic system management practices. A permit program could be administered by a state, a county, or a special agency.

The permit approach allows septic systems provided the system owner has obtained certification from a licensed professional that the system meets permit requirements. This places the burden on the system owner to take action (inspection and permit approvals) needed to have a legally operated septic system. Another approach is a septic system management agency which would own septic systems or at least be directly responsible for siting, designing, installing, and maintaining septic systems. Such a district would have to have authority to raise revenues, buy land or easements, make capital improvements, buy equipment, and charge user fees. The management district approach might be preferred by areas that want to implement a septic system plan with some community features, such as leaching fields serving clusters of homes rather than individual, on-site fields.

8. *Legal Framework*. Many states and localities have lax requirements which allow septic systems in areas where they will be a pollution hazard, such as areas with shallow or sandy soils or areas with high ground water. Other requirements may prohibit or restrict the use of innovative systems (such as those briefly mentioned in the introduction) which can be safely used in areas unsuitable for the traditional septic system. Some states prohibit cluster systems. Your 208 agency should review state laws and regulations and recommend changes to prevent use of septic systems in areas where they will pollute and to allow responsible use of innovative systems.

CITIZEN ACTION

1. Ask your agency whether your state or local laws permit the use of the more innovative on-site systems. Urge that the agency work for changes in the law which would permit these systems to be used.

2. Ask your agency if consideration is being given to cluster septic systems. If this also requires a change in the law, ask your agency to propose such a change.

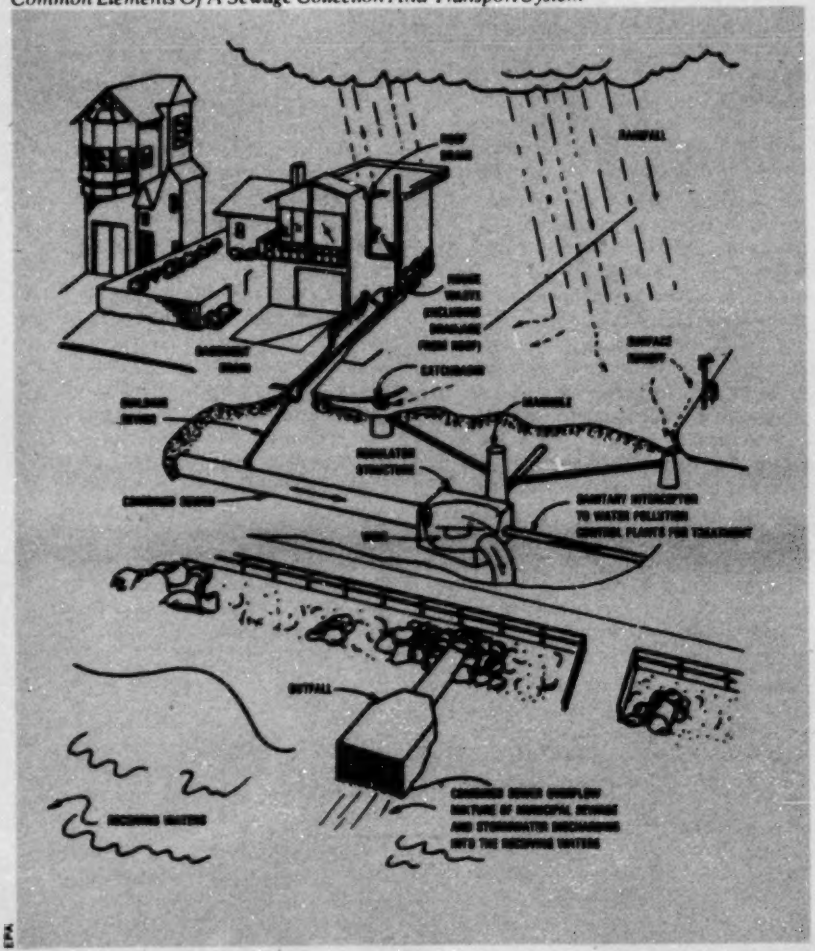
3. Ask your agency if the professionals responsible for septic system design, installation, and maintenance must be trained and licensed. If not, urge the agency to work for a licensing program.
4. With other local groups, bring in experts for a seminar or conference on septic system regulation and management in your area. Ask your 208 agency for a grant to put on the conference. Ask agency personnel to attend and to incorporate useful suggestions from the meeting into the 208 study and plan.

Urban Stormwater Runoff

Introduction

Urban stormwater runoff is the water which runs off lots, lawns, streets, paved areas, and rooftops after a rainstorm. Rain takes suspended particles and chemicals out of the air and gathers dust, debris, litter, animal refuse, and toxic substances from paved surfaces as it flows across ground.

Common Elements Of A Sewage Collection And Transport System



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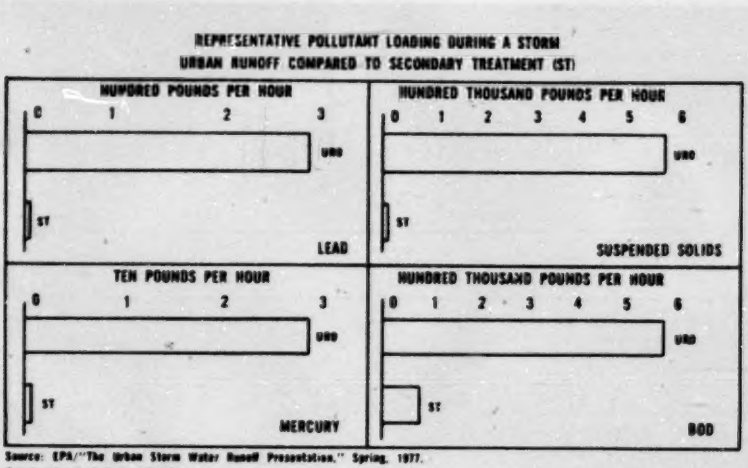


Source: EPA/"The Urban Storm Water Runoff Presentation," Spring, 1977. Dennis Athayde & Andrew Waldo.

Toxic substances in stormwater include salt and other de-icing chemicals applied to streets and materials such as lead, asbestos, and cadmium that come from cars and trucks. Urban construction sites contribute sediment and building materials such as paint and oil.

The pollutant-laden rainwater then flows into the sewer system. Stormwater enters either a combined sewer system which carries both municipal sewage (domestic and commercial) and stormwater runoff in the same pipes to the treatment plant, or a separate stormwater sewer which takes stormwater runoff directly to the nearest river or stream. When combined sewers are filled with stormwater, they often overload the treatment plant. The combined municipal and stormwater are then allowed to flow directly into the river via a bypass. Thus it is not just stormwater, polluted as it is that enters your streams and rivers when there is a treatment plant overflow, but stormwater mixed with sewage.

Severity of the Problem

According to an EPA report (*Urban Stormwater Management and Technology: An Assessment*, 1974), virtually every metropolitan area of the United States has a stormwater problem. These result from both combined sewers and separate stormwater systems. For example, the State of Illinois reported in 1975 that 45 percent of the pollution in the Chicago waterways is due to combined sewer overflows. In Rhode Island's Narragansett Bay shellfish harvesting in areas affected by sewer outfall from the City of Providence is suspended for seven days following a half-inch rainfall and for ten days following a one-inch storm. A study in Milwaukee found that, typically, 12 pounds of PCB's, 5,400 pounds of lead, 7,600 pounds of zinc, 2,100 pounds of copper and 170 pounds of chromium are on the streets and ready to be washed into the sewers by the next rainstorm. One pound of PCB's is enough to make more than 150,000 fish of an average weight of 3 pounds each unsafe for human consumption according to FDA standards.

The Program for Urban Stormwater Runoff

The program must be coordinated with several other programs in Water Quality Management, particularly with the construction of waste treatment facilities and the control of runoff from construction activities. It would cost billions of dollars to separate existing combined sewers and to build treatment plants large enough to handle all the stormwater that runs off city streets. Therefore the emphasis should be

on (1) control of pollution prior to runoff through land use controls and improved street and sewer cleaning, (2) storage of peak stormwater flows for later treatment, (3) reducing seepage (infiltration) into sanitary or storm sewers, and (4) complete use of existing sewer and treatment systems.

1. Technical Data

The EPA regulations require a Water Quality Management agency to collect information on urban stormwater. This data should identify:

- Existing and predicted urban stormwater problems, including those resulting from combined sewer overflows.
- Ways to control stormwater pollution to the level needed to attain the Water Quality Standards.
- Specific areas that need stormwater systems and the plans to provide such systems.
- Cost estimates.

Solutions should consider population; present and projected land use; the political and geographic boundaries of the area to be sewered; the amount of urban area within the boundaries; the amount of street surface in the urban area; the amount and types of pollutants in the area; methods of sewage and runoff treatment; the frequency, intensity, and amount of rain; and the nature of the body of water that receives the discharges.

2. Best Management Practices

Some important practices include:

- Establishing anti-litter education programs and ordinances;
- Using vacuum sweepers instead of mechanical sweepers (rotating brooms). Vacuum sweepers are more expensive, but they are more effective in removing small particles which compose much of the dirt on streets.
- Preserving natural drainage patterns by keeping as much land as possible in grass or other vegetation and by using new types of pavement which allow water to seep through and into the soil below ("porous pavement").
- Constructing temporary storage areas (sedimentation basins) to prevent rapid runoff from paved sites in shopping centers and subdivisions so that treatment plant overflow and bypass can be avoided. Sedimentation basins also reduce the amount of dirt and soil carried in runoff.
- Storing and reusing stormwater in water-deficient areas for recreational boating ponds, irrigation, fire-fighting, and cooling water for industry.
- Controlling the use of chemicals for weed and pest control.
- Developing subdivision regulations and building codes which require erosion controls.
- Cleaning catch basins and sewer pipes.

3. Regulatory Programs

Most urban stormwater will be covered by permits issued under the NPDES program. Combined sewers should be covered by the permit for the municipal waste treatment plant. EPA plans to require a locality to obtain general permits for all separate stormwater pipes. The general permit provisions must specify BMP's and be sufficiently stringent to attain Water Quality Standards.

Trash and Litter In Urban Stormwater

EPA

4. Designating Management Agencies

Several agencies will probably have important roles in the stormwater pollution control program. Some sample responsibilities might be for the Police Department to enforce an anti-litter ordinance and enforce parking regulations needed to keep curbs clear and allow street sweeping equipment to work effectively; for the Highway Maintenance Department to clean streets and catch basins; for the Public Works Department to clean sewers. If the program is to be effective, all agencies must understand their responsibilities and work together. Cooperation is more likely if a formal, written agreement is made among the agencies which will be working together.

CITIZEN ACTION

1. Municipal employee unions (police, sanitation workers, highway maintenance workers) have expertise that may be useful in developing BMP's for stormwater control. Contact them for help. Ask them to become members of BMP committees. Their cooperation may be essential in implementing BMP's.

2. Effective street sweeping is seriously impeded by parked cars. This is critical, because in some areas 70 to 80 percent of street dirt lies within six inches of the curb. Strict enforcement of parking regulations often provokes a hostile public reaction. You can help develop a better attitude toward parking enforcement by explaining and publicizing the relationship between parking regulations and water quality.

3. As a citizen and community member, make it a point to be concerned with the actions of nearby communities. If you share a resource body of water with nearby communities or are downstream of an urban area, it is important to realize that those areas' compliance with and enforcement of regulations can definitely affect the quality of your drinking, swimming, and fishing water. Uniform Water Quality Standards should be ensured by regulations which are formed at the state or federal level and which are applicable to everyone. Check that your community and your "neighbors" are enforcing these regulations.

4. For additional information on stormwater control, obtain *Urban Stormwater Management and Technology, An Assessment*, EPA 670/2-74-040, and *Urban Runoff Pollution Control Technology Overview*, EPA-600/2-77-047. A slide show with an accompanying cassette on urban stormwater problems and solutions can be obtained from the EPA regional 208 public participation coordinator.

Construction Activities

Introduction

This section covers pollution generated during the construction of houses, factories, shopping centers, highways, and other facilities. Construction of dams is considered in the hydrologic modification section of this chapter. Mud and dirt (sediment) are the most common pollutants which are washed from construction sites and into streams and rivers. Others include paint, cleaning solvents, concrete compounds, asphalt, salt, and petroleum products.

Severity of the Problem

About one million acres are disturbed for construction purposes each year in the United States. Although this seems like a relatively small amount of land, the rate of sediment runoff from erosion on such sites can be enormous. Under the same rainfall conditions, construction sites may have a sediment runoff rate 100 times the rate of sedimentation from farmland.

The Program for Construction Activities

1. Technical Data

Precise technical data on stream flows and water quality in local watercourses are not required to establish BMP's for construction sites. Surveys of existing construction sites should reveal contractors' current method to prevent nonpoint source runoff.

Patterns of weather stress should be established. More stringent controls will be needed for areas which experience periods of severe weather stress such as intense rainfall or hail. An inventory of easily erod-

Erosion And Sedimentation From Exposure Of Raw Soil In Residential Construction

able sites and areas adjacent of watercourses is needed. Sites such as hillsides, floodplains, and areas with soils which are prone to erosion should be identified so they can be given special protection. After Best Management Practices are instituted, monitoring water quality in watercourse areas should be undertaken continuously while construction is underway to assure that runoff is minimized and remedial measures are taken if problems do occur. This monitoring should continue after construction is complete, until the site has stabilized.

2. Best Management Practices

BMP's for construction fall into two areas: controlling erosion and controlling chemicals and other substances used on construction sites. Some principles which should be included in BMP's for erosion control are:

- Expose as little soil as possible and expose it for the shortest possible time. Soils which must be exposed should be quickly covered temporarily with sod or mulch (straw, wood chips, sheets or plastic, etc.). Permanent vegetative cover should be established as soon as possible.
- Prevent runoff and erosion from exceeding the preconstruction level by preserving as much of the natural topography and drainage as possible.
- Protect areas which are especially susceptible to erosion by placing them off limits to construction or by requiring very stringent erosion prevention practices in such areas.
- Ensure that predictable periods of intense rainfall do not lead to severe erosion by prohibiting ground-disturbing construction activities during those periods or by requiring very stringent control practices.

That portion of additional erosion which cannot be prevented by BMP's should be controlled by other means. This can be done effectively by sedimentation basins which trap increased runoff and allow sediment to settle out of the water before the water leaves the site. For many construction projects these basins should be permanent.

BMP's should require the use and disposal of chemicals, pesticides, and fertilizers in such a way as to prevent them from entering the water. This will require holding wastes on-site in containers for regular collection and safe disposal, or it may involve regulation of the manner and amount in which they are used.

3. Regulatory Programs

Before construction begins at a particular site, practices required to prevent water pollution should be established. These should include a plan to protect easily erodible areas, a schedule of activities to minimize soil exposure, and provisions to trap sediment before it leaves the site. Your state or locality may already have the legal authority to require such a plan as part of its authority to enforce building codes, require building permits, and approve site plans. Existing permit systems should be expanded to include BMP's, and penalties should be applied if BMP's are not carried out. When violations are discovered, work should be stopped until all required BMP's are put into effect. State and municipal contracts for highway construction should specify the BMP's that the contractor must use.

4. Designating Management Agencies

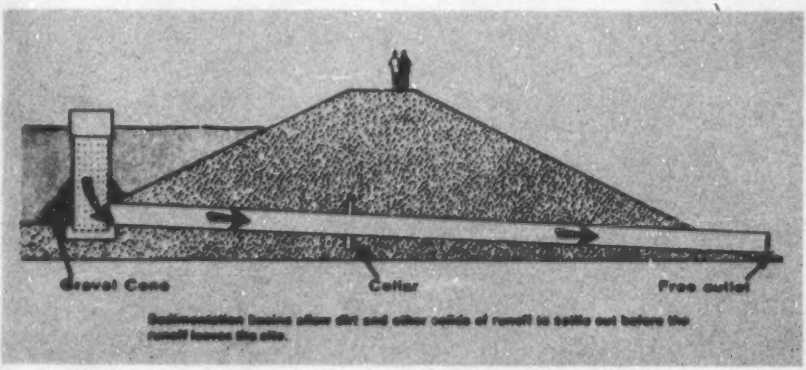
Many agencies may have authority over land development activities. The city or county engineer's office of the agency which administers subdivision regulations might be able to exercise BMP authorities.

USDA Soil Conservation Service

Laying Sod Over Exposed Soil On Steep Slope Is A BMP Which Can Prevent Erosion

CITIZEN ACTION

1. Urge that a committee be established to develop BMP's for construction activities. The committee should include affected persons or groups as well as representatives of the general public. If any building contractors in your area are known to be concerned with the environment, try and secure their participation. Construction labor unions are also a potential source of expertise on construction practices that can damage, or protect, the water.



Sedimentation basins allow dirt and other solids of runoff to settle out before the runoff leaves the site.

Fairfax County, Virginia

2. Urge that your agency undertake a review of existing structures and ordinances relating to the impact of construction activities on water quality.
3. Obtain EPA's *Nonpoint Source Control Guidance, Construction Activities* from the Water Planning Division. It provides additional information on pollution from construction sites and includes a more complete list of preventive practives than is included in this section. It also references many other sources on controlling pollution from construction sites. A slide presentation with an accompanying cassette entitled "Construction" can be obtained from EPA regional public participation coordinators. It illustrates water pollution from construction sites and a sampling of BMP's.

Agricultural Activities

Introduction

Traditionally, farmers and ranchers have been concerned about erosion because of the consequent loss of productive soil. The passage of the Clean Water Act, however, has expanded that concern to include water quality.

Crop production can cause water pollution by exposing soil to the erosive forces of water and wind; by substituting crops for the indigenous vegetation near watercourses or in fragile soil areas; by using fertilizers in such volumes or at such times that they can be expected to leach into surface or ground waters; by using pesticides, herbicides, and fungicides so that they drain into watercourses; and by allowing irrigation water polluted by chemicals, sediment, and dissolved salts to flow into surface waters.

Animals can contribute to water pollution when they are concentrated in or near streams and rivers, where they break down stream banks, disturb steam bottoms, deposit wastes in or near the water, and destroy vegetative cover that prevents erosion.

Severity of the Problem

Sediment is the major water pollutant from agricultural activities.

The U.S. Geological Survey has estimated that nearly 4 billion tons of sediment reach our streams each year. About 50 percent of this is from agricultrual activities. In addition to sediment, scientists estimate that every year farming operations add 2 million tons of phosphorus and 3 million tons of nitrogen to our rivers and streams. Over 1 billion pounds of chemical fungicides, insecticides, and herbicides are applied annually to more than half the nation's farm-

USDA Soil Conservation Service

lands. Many of these chemicals end up in streams after a rain.

Irrigation may substantially increase the flow of these chemicals and other salts into streams. According to the *Compilation of Federal, State and Local Laws Controlling Nonpoint Pollutants* (EPA, 1975, p. 57), "irrigation represents a significiant mechanism for the transport of contaminants for agricultural activities, since the process involves leaching and the transport of dissolved minerals (and salts) from the soil." The United States irrigates approximately 44,000,000 acres of land. Irrigation accounts for approximately 82 percent of the total national water consumption for the contiguous 48 states.

The Program for Agricultural Activities

Elements of a good program are: the establishment of locally agreed-upon Best Management Practices; requiring plans for each farm which remedy pollution problems; the protection of watercourses by means of "critical area" designations; and technical assistance provided by state agencies, the U.S. Department of Agriculture, and EPA.

1. Technical Data

A site-specific evaluation will be needed to discover the water pollution problems caused by the operation of a particular farm or ranch. Information of different kinds will be needed, such as:

- Climate, including precipitation volume, intensity, and distribution through the year.
- Land characteristics such as slope length and gradient (degree of slope) and identification of particularly steep areas.
- Susceptibility of soil to erosion, which is determined by texture, organic content, structure, and permeability.
- Correlation between soil erodibility and topography.
- Proximity of ground and surface water bodies to areas to crop production.

Other factors associated with crop production that must be analyzed include field and drainage engineering; cropping methods; application of fertilizers, pesticides, herbicides, and insecticides (frequency and timing of application, amounts, and types); types of crops and their soil impacts; quantities and dispersal of animals; the method, intensity, and duration of applied irrigation water; and the cyclical nature of the operation (such as plot resting or crop rotation).

Bureau of Land Reclamation

Aerial Spraying of Pesticides Can Lead To Pollution If Spray Drifts Into Water Bodies Or Is Carried By Irrigation Runoff

These data can be collected through soil surveys, climatic maps, hydrologic, geographic, and topographic maps; and assessments of the farmer or rancher's operations.

2. Best Management Practices

Best Management Practices to reduce water pollution from agricultrual operations include structures to trap sediment and other pollutants before they run into surface waters and nonstructural measures to prevent erosion and minimize the use of pesticides and fertilizers.

Structural solutions include: barriers; catchment systems; diversions; storage basins for runoff, irrigation water, and animal wastes; and drainage systems to filter runoff, hasten infiltration, and minimize runoff.

Nonstructural measures include:

- Minimizing soil disturbances and open fallow (letting fields lie bare) through specific cultivation practices such as chisel

Windbreaks Are One BMP Which Can Prevent Pollution From Agriculture

plowing, stubble mulching, no-till conservation methods, strip or contour cropping, and field terracing.
- Planting grass in waterways to minimize erosion and filter pollutants from draining waters.
- Preventing overgrazing and fencing to keep animals away from watercourses.
- Maintaining permanent plant cover on fragile soil areas.
- Carefully controlling the amounts and locations of chemicals and fertilizer applications.
- Maintaining buffer strips between field borders and stream banks and preserving swamps and wetlands along watercourses to filter pollutants before they enter the water.
- Bisecting fields with windbreaks to retard wind erosion.
- Setting soil loss limits by using the University Soil Loss Equation developed by the Soil Conservation Service in planning BMP's.
- Cooperating with local conservation districts in the preparation of a soil survey to establish the crops, planting methods, and crop rotations best suited to the land for protection of soil and water resource quality.

Nonstructural Best Management Practices for irrigated agriculture include:
- Careful studies of the least amount of water the crops on a farm will need to produce satisfactory yields.
- The use of precipitation forecasts to utilize rainfall rather than irrigation to nourish crops.
- Minimal fertilizer and pesticide applications.
- Proper selection and design of furrow slopes to reduce sediment losses and mineral and salt leaching when water flows through the furrows. For example, shorter furrows with curved patterns can reduce sedimentation because the water will drop smaller concentrations of deposits at more frequent points than with a long, straight channel.

Structural approaches include:
- Sedimentation basins.
- Taking irrigation runoff from one field (tail water) to use on another field.
- Sprinkler and drip systems to reduce water needs and lower runoff volumes.
- Specific treatments for individual pollutants in the soil and water, such as desalination.

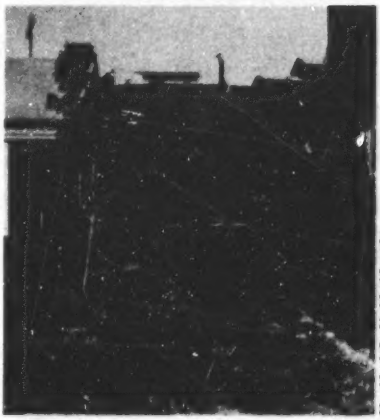
3. Regulatory Programs

The Clean Water Act requires "a process to (i) identify, if appropriate, agriculturally . . . related nonpoint sources of pollution, including runoff from manure disposal areas and from land used for livestock and crop production, and (ii) set forth proce-

dures and methods (including land use requirements) to control to the extent feasible such sources."

A sound approach for a regulatory program may be a state erosion and sediment control law which covers agricultrual activities. Fourteen states have adopted such erosion and sediment control laws, but most of them exclude agriculture. Agricultrual operations in Pennsylvania and New York must have soil conservation plans; some local conservation districts in other states have the authority to regulate erosion and sediment through permit programs and land use controls. One of the first agricultural nonpoint source pollution regulatory programs to be developed under Section 208 planning was passed, by referendum, by the Lewis and Clark Soil and Water Conservation District in Montana in June of 1977. This program consists of a mandatory local sediment control ordinance administered by the conservation district.

Some states have also taken measures to control agricultural chemicals which can cause severe water quality problems. The California, Massachusetts, and New Jersey Departments of Agriculture can refuse registration of fertilizers which may harm beneficial plant life even when such fertilizers are properly used. Programs to control agricultural nonpoint source pollution may be enforced at the local level but the states should have the authority to step in, initiate complaints, and prosecute offenders if local-level enforcement is not effective. Animal feedlots and irrigated agriculture are now covered by the NPDES point source permit program.



Grassed Waterways Can Be A BMP In Both Agriculture and Various Types of Construction Activities

4. Designating Management Agencies

Management agencies for agriculture programs should be established at both the state and local level with different duties assigned to each level of government. At the state level the appropriate agency may be either the state department of water resources, the department of agriculture, or the department of environmental protection. The state agency should be able to provide back-up authority if local-level management is not effective. The local agency may be a county or the local conservation district. This agency should be responsible for seeing that Best Management Practices are being used and that individual farm plans are being developed and implemented. Agreements between the local governmental units and the state may be necessary in certain states to assure that the respective duties of each agency are carried out.

CITIZEN ACTION

1. Ask your state Water Quality Management Planning agency whether agriculture has been identified as a problem in your

area or state. (It has been listed as a problem in many states thus far.) If agriculture is important in your state and it was not listed as a priority problem, urge your agency to establish it as a priority. Write a letter to your agency, to your governor, and to the regional EPA office.

2. Ask your state agency whether a committee that includes farmers, ranchers, and interested citizens has been established to determine the most appropriate Best Management Practices for your area. If not, write a letter to the agency urging that such a committee be established.

3. Ask your state agency whether it has developed a list of techniques which are applicable as Best Management Practices to safeguard water quality in the state.

Silvicultural Activities

Introduction

Silviculture is the cultivation and harvesting of timber for commercial purposes. It includes all related activities such as reforestation, intermediate practices such as thinning, fertilization, pest control, and fire retardation; and road and trail building to provide access for harvest machinery and to haul logs out of the forest. Four major types of pollution can result from silviculture:

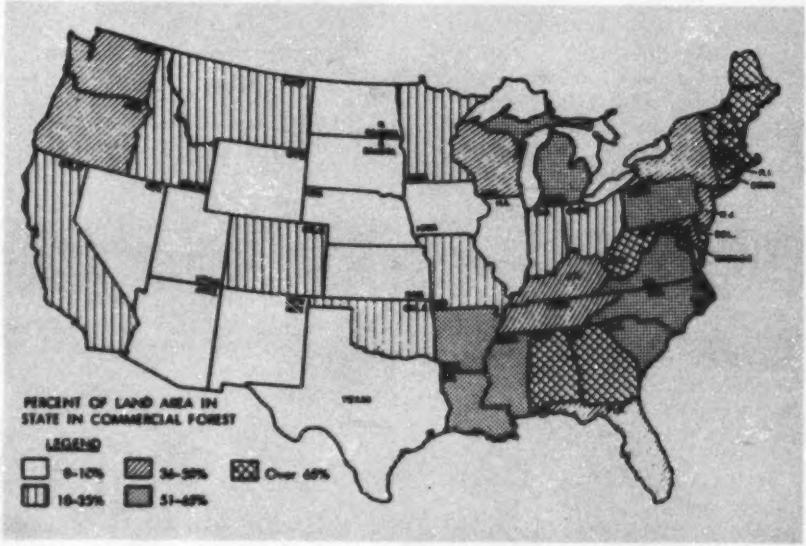
1. *Sediment.* This is created by erosion from logging roads, erosion from skid trails (paths created by dragging the freshly-cut logs to a loading area), erosion from the harvest area itself, landslides in areas with unstable soil where roads have been constructed and logging operations carried out, and erosion from scouring of watercourse sides and bottoms due to more rapid runoff from harvested or disturbed land surfaces.

2. *Organic matter.* This includes logging residues of bark and other woody debris. These materials can alter the physical and chemical balance of the water.

3. *Pesticides, herbicides, fertilizers, and fire-retardant chemicals.* These can harm adjacent aquatic ecosystems, encourage the growth of algae, and degrade water quality.

4. *Thermal damage.* This can occur when trees are removed along watercourse banks, thereby exposing streams to the sun and resulting in increased water temperature. These temperature increases cannot be tolerated by some game fish and other important forms of aquatic life.

Commercial Forest Land In The United States



Severity of the Problem;

About one-third of the area of 50 states is covered with forest. About 67 percent or 500 million acres, of forest land is commercial forest (lands capable of growing 20 cubic feet of woody fiber per acre per year). In recent years, silvicultural operations on the nation's commercial forest land have averaged millions of acres per year. Silviculture causes a severe pollution problem in some areas.

The Program for Silviculture

Proper forest management is vital to protecting water quality. The objective of the program for silviculture should be twofold. It should encourage forest management practices which will enhance water quality. At the same time it should restrict or prohibit practices which may have short-term commerical advantages but which are not good long-term forest management practices and which can have adverse water quality impacts.

1. Technical Data

Many factors will influence the design of a control program: susceptibility of soils to erosion; slope gradients; existing vegetation; climate variations and extremes; proximity to wetlands and surface water bodies; the size and flow characteristics of these bodies; and the characteristics of the silvicultural operation including type of activity, number of acres involved, and scheduling. This information can be obtained from aerial photos, topographic and geologic maps, soil surveys, climatological studies, hydrologic studies, and on-site surveys.

2. Best Management Practices

General approaches which should guide development of BMP's include minimizing disruptive activities which will result in the release of natural forest constituents such as sediment into the water, introducing as few new pollutants into the forest as possible, and carefully controlling silvicultural activities to keep natural and introduced pollutants out of the water. Different practices should be used for different types of silvicultural activities.

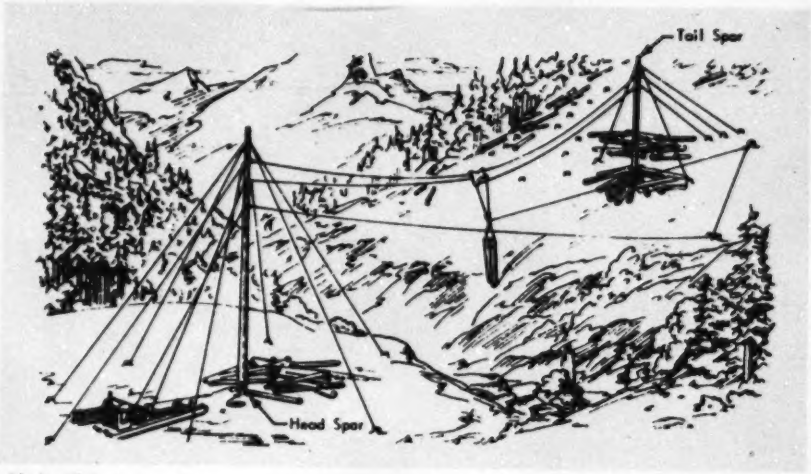
EPA

Erosion Of A Logging Road Embankment Leading To Sediment Release And Loss Of Forest Vegetation

Roads and Trails—Construction, operation, and decay of road and trail systems are the greatest source of sediment from logging. If roads and trails are carefully laid out, maintained, and rehabilitated after use, the amount of sediment they contribute can be greatly reduced. Some practices which should be considered for Best Management Practices include:

- Planning road systems carefully to reduce total length required.
- Avoiding rugged terrain where extensive cuts and fills will be needed.
- Keeping roads and trails out of watercourses and areas near surface water bodies.
- Avoiding the use of fill which will erode easily.
- Preventing erosion of trails, roadsides, and fill by immediate mulching or seeding.
- Preventing erosion of roadside drainage channels by surfacing them with hard materials or by building turnouts and other structures to slow velocities and retard volume buildup.
- Avoiding the use of herbicides to prevent growth of vegetation on roadsides; mowing vegetation with boom mowers.
- Prohibiting the use of roads which are not finished.

Harvest Operations--Trees are harvested singly or in small groups (selective cutting), in larger groups but with some trees remaining to reseed cut areas (seed-tree or shelterwood cutting), or by completely cutting large areas (clearcutting). Clearcutting will generally result in more intense activity,



Skyline Logging

more immediate disruption of the soil, disruption over a larger area, and hence more sedimentation. This can be mitigated, however, by cable systems which lift the whole log off the ground as it is transported from the cutting site to the collection point for transfer to trucks. The alternative, skidding logs to trucks behind a tractor, can seriously disrupt the forest floor and cause severe erosion. It is a major source of pollution from harvest operations. Cable systems are difficult to use in areas which are not clearcut, so retrieval of logs by motorized equipment, as an alternative to skidding, should be used as much as possible in selective and shelterwood harvesting.

BMP's should consider the advantages and disadvantages of the various harvest systems, and probably should place some limitations on all of them. Whichever system of harvest is used, a major objection should be to avoid distrubing the root mat or root network which underlies the living forest. This holds soil in place for a period of time even if trees are removed. Root mats vary in depth depending on tree species, soil type, and slope. One consideration in preserving root networks is minimizing the use of heavy equipment which tears up the ground and compacts the soil. Thus the use of bulldozers and other heavy, tracked vehicles should be avoided when possible.

Another consideration is that roots will begin to rot once trees are cut. With clearcutting, all roots in an area will be decaying simultaneously. This can have serious adverse effects where extensive areas are clearcut or where clearcuts occur on steep slopes. The following general recommendations for limitations on clearcuts were made by Edward C. Crafts, former deputy chief of the U.S. Forest Service, in a 1972 speech to the annual convention of the Society of American Foresters:

> For hardwoods, no clearcutting except for emergency conditions of fire, insect and disease control. In general, this would mean no clearcutting east of the 100th meridian save for northern and southern pineries. An exception could be aspen and paper birch.
>
> For softwoods, no clearcuts in excess of 25 acres; during any 10-year period, the uncut area in any timber sale should equal or exceed the clearcut area; during any 10-year period, no clearcut area should be closer than 5 to 10 chains from the next nearest clearcut; and slash should be disposed of.

Some more specific BMP's are to:

- Prohibit logging on steep slopes and in areas where soils erode easily;

- Substitute rubber-tired vehicles for tracked vehicles wherever possible;
- Require cable systems with clearcuts which would otherwise lead to water quality problems;
- Establish streamside buffer zones which will be off-limits to vehicles. These zones filter out debris and sediment transported by runoff from adjacent harvest sites. Such zones can also reduce thermal pollution by preserving shade cover over watercourses.
- Prohibit or carefully manage cutting in buffer zones so that shading of watercourses is maintained (use selective cutting);
- Avoid harvesting activities in periods of high or intense rainfall.

Immediately or as soon as possible after harvest operations, block trails and associated drains with earth barriers so they will not erode and become gullies. Exposed soil should be reseeded with grass and trees. Roads that will no longer be needed for silvicultural activities in the area should be closed. Temporary bridges and fill should be removed so that future drainage of watercourse flows is unimpeded by deterioration of these structures.

Intermediate Practices—

- Site preparation associated with reseeding of commercial species often involves deep scratching or turning of the earth. This can cause serious sedimentation from steep slopes and areas with easily erodible soils. Intensive site preparation of fragile areas should be prohibited or carefully controlled to prevent soil disruption. Hand planting in fragile areas can avoid excessive disruption of the soil.
- Minimize herbicide use and substitute controlled use of fire and mowing.
- Carefully control pesticide use. (Commercial pesticides must be used according to label restrictions.)
- Encourage biological pest control mechanisms. In some cases selective cutting of diseased areas or clearing swaths around diseased areas is sufficient to control pests.
- Limit aerial application of fertilizer to pellet forms, and prohibit liquid fertilizer sprays.
- Prohibit the application of herbicides, pesticides, or fertilizers in watercourse and wetland buffer zones unless special permission is obtained and such chemicals are applied by hand. Prohibit their direct application to watercourses.

BY PLACEMENT OF LOGGING DEBRIS OBSTRUCTION

3. Regulatory Programs

The NPDES permit program applies to four itemized silvicultrual activities which EPA considers point sources: rock crushing, gravel washing, log sorting, and log storing. Several states, including California and Washington, have legally adopted forest practices acts which provide varying degrees of control over nonpoint source pollution from silviculture. Other states rely on voluntary compliance with forest practice standards.

The State Conservation Commission of Pennsylvania has developed an approach based on a state sediment control law. Under this law every operator is required to have an erosion and sediment control plan on-site. If there is a spot check, and the operator does not have a plan, he can be subject to a variety of warnings and sanctions. Work cannot begin on sites of more than 25 acres unless a permit has been granted.

Performance bonds can be an important part of the control program. Bonds deter large abuses by insuring that funds are available to correct damage to fragile areas or streams which result from poor silvicultural practices. Licensing of forest operators is another approach. To become licensed, operators must be trained in environmentally sound practices. The program should provide for suspension of licenses if such practices are not followed.

Enforcement of silviculture regulatory programs can be based on interagency agreements between forestry and water quality agencies which provide for review of applications for silvicultural activities and joint inspection of logged sites. There should be a system of warnings for the logging operators prior to any enforcement action, but provision for stop-work orders should be part of the permit program.

4. Designating Management Agencies

Several agencies could be designated as management agencies for silviculture. Your 208 planning agency may have already brought together into a committee representatives of the agencies involved in timber activities, members of affected groups, and interested citizens to develop Best Management Practice for silviculture. This group or committee could also discuss appropriate management arrangements. Agencies involved in timber activities include the U.S. Forest Service, the state forestry agency, the state conservation districts, and the U.S. Soil Conservation Service. These agencies may all exercise responsibilities in the program to control pollution from silviculture. The management system should be formalized by interagency agreements. One agency should have the primary responsibility for coordinating activities and monitoring the program to be sure that the system works as planned and is preventing pollution from silviculture.

CITIZEN ACTION

1. If your state or areawide agency has not listed silviculture as a problem and your state or area has a significant amount of timber harvesting, urge your agency to list silviculture as a priority.

2. If your agency does not have a committee to develop Best Management Practices for silviculture, urge that one be established. If no interested citizens or conservation group representatives are on the committee, urge the agency to include them.

3. Contact the labor organization which represents workers in silviculture. It will have detailed knowledge of logging operations which may be useful in developing BMP's and control programs. Urge that the organization be represented on your 208 agency's silviculture committee.

4. For more detailed information on silvicultural operations and pollution control obtain the following publications from the Water Planning Division of EPA: *Processes, Procedures, and Methods to Control Pollution Resulting From Silvicultural Activities* (EPA 430/9-73-010) and *Nonpoint Source Control Guidance, Silviculture*. A slide presentation and an accompanying cassette on silvicultural pollution and BMP's can be obtained from the Public Participation Coordinator in each EPA Regional office.

Mining Activities

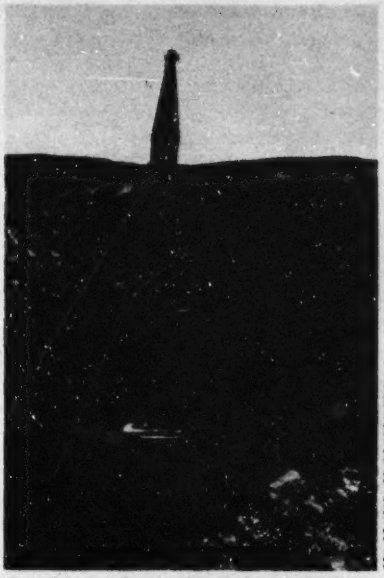
Introduction

Although mining activities range from phosphorous mines to sand and gravel pits and from gold leaching to coal mining, mining activities fall into two basic categories: surface mining, such as strip and open-pit, and underground mining. Sediment and acid are primary pollutants caused by mining. Sediment results from mining exploration, construction of roads and facilities, disposal of mine wastes, and abandoned surface mines. Cave-ins of abandoned underground mines and surface mines in hilly areas have caused landslides and devastating erosion. Acid and other chemicals are washed from exposed minerals in surface mines and mine wastes. Underground mines can flood and spill polluted water into nearby streams. Acid drainage has polluted both ground and surface waters. Sediment problems occur wherever there is mining; thus far acid drainage problems have occurred primarily in the Appalachian coalfields.

Severity of the Problem

In 1970 more than 12,000 miles of streams were affected by pollution related to mining operations. Most of this resulted from coal mining in Appalachia. Inactive mines are responsible for much of the problem – more than 5,000 miles of Appalachian streams are polluted from abandoned underground mines. If our national energy policy places increased emphasis on coal, it could lead to even greated pollution problems, but coal mining is not the only factor. Surface mining for phosphates in Florida has turned thousands of acres into a barren moonscape environment, led to salt water contamination of groundwater, and exposed radioactive materials which are being leached into the groundwater. Open-pit sand and gravel mining occurs in every state. Abandoned surface mines have an erosion rate of 2,400 tons/square mile per year, making a combined total of 50,400 tons.

Although erosion is the worst problem, chemical pollution from mining is also very serious. The huge amounts of these



USDA Soil Conservation Service

Strip Mining For Coal In Colorado With A Dragline

pollutants and the fact that they are undiluted make them a severe problem.

A Program for Mining Activities

The major objectives of a source control program for mining are: a) saving the topsoil, which is necessary to assure that the area will continue to support vegetation; b) minimizing exposure of raw soil; c) restoring the area to its pre-mining condition; and d) protecting nearby ground and surface waters.

1. Technical Data

Control programs for mining pollution should consider specific local or regional conditions which will differ with the material mined; whether the operation is surface or underground; whether the problem results from active or abandoned mines; and other factors such as climate, geology of the area, relationship to the groundwater, slope, and local vegetative cover.

The data associated with each actual mining operation should include method,

number and size of operations, location and construction of access roads, layout and construction of drainage structures, maintenance practices now used, past mining history of the area, and characteristics of the potential pollution sources.

These data can be obtained through aerial photographs; surface water and groundwater monitoring; soil, slope, and vegetation surveys; climatic maps and studies; and local geological and topographical studies. The items concerning the mining activity itself should be gathered and spelled out by the operator, responsible company, and responsible governmental agencies.

2. Best Management Practices

Many of the practices which control sediment in construction and forest road building will also be effective in mining operations. A wide variety of BMP's apply specifically to mining. Sample BMP's for different types of mining operations are listed below.

Surface Mining–

- Careful site location, to avoid areas where water pollution cannot be prevented.

Surface Mine

EPA

- Preserving topsoil for later reuse and protecting topsoil from erosion while it is being stored.
- Leaving some of the mineral in place to seal water within the mine area so it cannot seep to the surface or into groundwater.
- Insulating polluting material from groundwater by using impermeable material such as clay.
- Revegetating areas stripped of soil cover.
- Restoring the original slope ("regrading") and filling with topsoil.
- Prohibiting mining in or near watercourses.
- Diverting watercourses or groundwater away from mine sites.
- Using structures such as detention basins to keep pollutants from reaching survace waters.
- Neutralizing acid wastes by adding lime.

Underground Mines

- Using strong and durable roof supports to prevent collapse.
- Excluding air from inactive mines to keep pollutants from forming. This can be done by filling inactive mines with oxygen-free, incombustible gas.
- Preventing infiltration of water into the mine.
- Sealing mines to prevent polluted water from seeping out.

The 208 agency should consult mine operators, workers and adjacent landowners as to whether BMP's already in use should be continued or carried out more carefully.

Many of the techniques used to terminate surface or underground mining operations in a sound manner can also be used to control pollution from inactive mines.

Mining reclamation can lead to benefits not directly related to water quality. Reclaimed surface mined areas can become useful farms, forests, parks, and wildlife habitats.

3. Regulatory Programs

A significant amount of water pollution from mining is controlled through the NPDES permit program. NPDES permits apply to those mining sources which discharge from any discernable, confined, and discrete conveyance, including any pipe, ditch, channel, conduit, etc.

The federal "Strip Mine Bill" passed by Congress and signed by President Carter in August 1977 establishes federal control over strip mining for coal. This law will aid substantially in preventing pollution from surface mining. Another regulatory program must be used for other types of mining. Logically, mining regulations should be a federal or state responsibility. Some states have already developed mining permits and licensing programs which include erosion and sediment controls. Some elements which control programs might include are as follows:

- Requiring permits for mining and mining exploration.
- Incorporating BMP's into permits.
- Providing authority for inspections and stop-work injunction if permits are violated.
- Requiring pre-mining planning for ground and surface water control, reclamation, and sealing.
- Delegating authority and responsibility to stop pollution from abandoned mines.
- Requiring performance bonds and reclamation plans for every operation.

4. Designating Management Agencies

Agencies which might be candidates to carry out the pollution control program for mining include local conservation districts and the state agency controlling mining. Whichever agency is designated, it should coordinate its activities with state and local land use control boards. The agency designated should have the staff to carry out its responsibilities efficiently. Understaffing can lead to administrative delays in giving permits, approving plans, etc. Delays may cost mine operators money and could well cause a backlash against the program.

CITIZEN ACTION

1. Contact your state Water Quality Management planning agency and find out whether mining has been designated a high-priority problem. If it has not been and you believe it is a problem in your state or area, urge your planning agency to designate it.
2. Ask your 208 agency whether it has established a committee to develop Best Management Practices. If such a committee does not exist, urge that one be established.
3. Urge your agency to include affected parties, mine owners, mine operators, miners, representatives of mining unions, and members of the general public as well as environmental groups on such a committee.
4. Ask your 208 agency to explain the influence of the federal strip mining bill on the pollution control program in your state or area.
5. The Environmental Policy Institute report on state mining laws in 38 states may be a source of ideas on what works and what to avoid. Copies can be obtained from EPI, 200 3rd Street, S.E., Washington, D.C. 20003.
6. If you have a mining problem in your area and are interested in working with your agency to prevent it, you will need more information. Much useful information will be found in *Procedures and Methods to Control Pollution from Mining Activities* (EPA-430/9-73-011) and *Inactive and Abandoned Underground Mines* (EPA-440/9-75-007), both of which can be obtained from the Water Planning Divi-

EPA Documents

Point Source Pollution From Mining-Acid Drainage

sion. A slide presentation with an accompanying cassette which depicts mining pollution and BMP's can be obtained from the Public Participation Coordinator in each EPA Regional office.

Hydrologic Modifications

Introduction

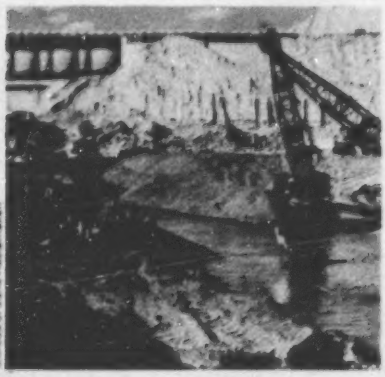
A hydrologic modification is the alteration of a stream channel by redirecting, deepening, or damming it, usually for water supply, improved drainage, or flood control, but sometimes for mining in streambeds. Areas undergoing rapid development may influence downstream channel changes because of the increase in volume and velocity of surface runoff. Installation of impervious surfaces such as streets and parking lots can cause permanent hydrologic change in drainage patterns and can aggravate modification problems such as erosion of watercourse banks and beds.

Hydrologic modifications are regulated under other parts of the Clean Water Act; Section 402 requires permits for point sources and Section 404 requires permits for dredging and filling navigable waters.

Severity of the Problem

Virtually all hydrologic modifications result in pollution. Sediment is the principal nonpoint source pollutant resulting from hydrologic modifications. Sediment may be generated by construction of the modification; it may be scoured from stream bottoms or banks if the modification results in increased flow velocities; or it may result from land use changes stimulated by the modification. An exmaple of a land use change leading to sedimentation problems might be as follows: Construction of a flow regulating dam prevents periodic flooding of woodland areas along a river. With the flood danger gone, the area is developed with single family homes. The rate of runoff from the developed area increases and causes erosion and sedimentation which pollutes the river. If the land use change had been to agriculture not only sediment would have been a problem but other pollutants such as pesticides and fertilizers might have increased as well. Removing shade trees along a stream as part of a modification and maintenance program can cause serious thermal pollution.

Hydrologic Modifications In Progress At Grand Coulee, Washington



Bureau of Land Reclamation

The actual construction activity frequently required by hydrological modifications can itself cause considerable damage in and along the stream bed. It may take months or years to stabilize stream banks to prevent erosion. Often the maintenance programs for such modifications prevent full recovery (such as the regrowth of trees), and the polluting effects continue indefinitely.

The Program for Hydrologic Modifications

1. Technical Data

Hydrologic modifications are similar to construction, logging, and mining activities in that they involve building structures and access roads and the use of heavy equipment. Thus the kinds of information on geology, soils, vegetation, and climates, mentioned in previous sections on these activities are also needed to develop solutions for nonpoint source pollution from hydrologic modifications. Hydrologic modifications are different in that they usually involve construction in the water; thus information on water quality, flow rates, and seasonal flows is also needed. In addition, an inventory of all existing hydrologic

modifications must be prepared. These modifications must be assessed to determine how much they are contributing to water pollution.

2. Best Management Practices

Construction activity should be held at a minimum in or along the watercourse. Often drainage or flood problems result from debris or sediment that has built up in the natural channel. Removing debris and sediment by careful "snag and clear" operations can provide the desired relief. If such operations remove debris and sediment without actually moving heavy equipment such as bulldozers into and down the channel itself, a great deal of pollution and watercourse resource destruction can be avoided. A good alternative to heavy equipment is the use of winches attached to trees or long boomed equipment operating from the bank.

However, if a hydrologic modification is absolutely necessary, a number of practices should be used to minimize pollution:

- Channel modification should be restricted to channel deepening, not widening or straightening. Widening the channel can spread the water too thin to support aquatic life. The original stream channel should be maintained to allow the stream's self-cleaning mechanisms to continue and to moderate stream gradients so that high water velocities, which increase erosion, do not occur.
- To the extent feasible, modification activities should not go on near important wetland, watercourse, and groundwater recharge areas or near fish and wildlife habitats.
- Access roads for construction should be on only one side of the watercourse and be as narrow as possible, preferably not more than 50 feet in width. Roads should be planted over with grass and shrubs when construction is completed.
- Forest cover should be maintained on the side opposite the access road to provide protection from thermal pollution.
- Excavated material should be scattered away from the stream, or if the material is piled up, it should be shaped and graded so it can be planted with vegetative cover.
- Channel banks should be graded to a slope that will support vegetative cover. This will minimize erosion of channel banks during any subsequent high flows.
- During construction, debris and sediment traps should be installed and regularly cleared within the work zone and at its downstream terminus.
- Construction should be carried out in dry seasons of the year.

USDA Soil Conservation Service

Using Heavy Equipment In the Stream Bed Is Certain To Cause Pollution

Impoundments are dams, weirs, or other structures which hold back water from flowing downstream. Adverse water quality caused by impoundments can be reduced by the following practices:

- Avoid flooding important watercourse and wetland resource areas.
- Carry out construction in dry months.
- Seed filled areas with grass and woody vegetation immediately following construction.
- Cover channel beds and sides with crushed stones (riprap) at the spillway outlets to protect against scouring and erosion.

Continuing maintenance of watercourses will be necessary to keep them free of debris, to assure that vegetation is growing on adjacent areas, and to stabilize sections

of channel bank that may degrade under stresses caused by high flows.

Mining activities in watercourse areas might be carried out only after channel flows have been diverted to an aftificial and well-stabilized watercourse for the duration of the operation. Flows should be returned to the original watercourse when the mining is completed and surfaces exposed by mining are well stabilized.

3. Regulatory Programs

Many existing hydrologic modifications are serious sources of water pollution. The regulatory program for hydrologic modifications should implement practices to stop continued pollution from existing hydrologic modifications as well as to prevent pollution from new modifications.

An adequate control program for hydrologic modifications will include a permit program. Each permit must require Best Management Practices and include penalties or performance bonds for violations. Agreements regarding land use for all areas adjacent to the modified watercourse should be implemented to assure protection of surface and subsurface water supplies. For example, development on drained land near the watercourse could lead to pollution of the watercourse by surface runoff. This can be anticipated and prevented.

4. Designating Management Agencies

Agencies which currently carry out or contract for hydrologic modifications are the most likely to be designated. However, these agencies should operate according to interagency agreements with state and federal agencies responsible for water quality and natural resource preservation. Such agreements should provide protection for any watercourse subject to modification activities.

CITIZEN ACTION

1. Urge your state Water Quality Management agency to establish guidelines to evaluate whether or not a hydrologic modification is needed and, if so, what type of restrictions should be applied to the modification activities.

2. Urge that the same committee also develop Best Management Practices for the maintenance of modified areas, including existing modifications.

3. Citizens can assist state and local planning agencies in preparing a complete inventory of existing hydrologic modifications by informing agencies of any modifications they know about. They can also tell agencies which existing modifications are causing serious pollution problems.

Residual Wastes

Introduction

Residual wastes are the unwanted substances that remain after man's activities. They can be solid, liquid, or sludge. They include trash; garbage; sewage sludge; debris; leftovers from industrial processes, agriculture, or mining; and other substances which humans leave behind. Residual wastes can pollute the water if they are put directly into it, if liquid or sludge substances are disposed of on land where they can flow or seep into the water, or if rainwater or surface streams pass through disposal sites and pick up wastes before running into the water.

Preventing water pollution from residual wastes extends beyond 208 planning and is coordinated with a new federal law which directly addresses all aspects of residual waste generation and disposal. This law is the Resource Conservation and Recovery Act of 1976 (RCRA or Solid Waste Act).

Severity of the Problem

According to Sheldon Myers, EPA Deputy Assistant Administrator, "In this country we annually generate some 135 million tons of municipal waste, 260 million tons of industrial waste, and 7 million tons of sewerage sludge. These numbers increase . . . at the rate of about 5 percent per year. The municipal solid waste component alone of this waste drain consists of the following: 67 percent of all the paper produced in the United States; 81 percent of all the glass produced in the United States; 12 percent of all the steel produced in the United States; 16 percent of all the aluminum . . . Our studies indicate that

90 percent of land disposal is done in an environmentally unsound manner."*

In the past, residual wastes have usually been deposited in dumps or sanitary landfills. This practice causes serious problems because the liquid residue (leachate) frequently leaks (leaches) from the site and pollutes ground and surface waters. About half the country depends on groundwater for its drinking water supply.

The Program for Residual Wastes

A complete program for residual wastes should cover three areas: (1) producing less waste, (2) recycling used materials, and (3) disposal. Waste reduction and recycling have water quality benefits in that they lead to reduced water pollution from manufacturing (including raw material extraction and transportation). All three elements are essential for a complete program; however, 208 is oriented toward planning to prevent pollution from those residual wastes which cannot be avoided or recycled. Therefore, the emphasis here will be on ways to ensure that waste disposal does not lead to contamination of ground or surface waters.

1. Technical Data

- An inventory of all solid waste facilities within the area or state. The inventory should include identity, location, and life expectancy. RCRA requires inventories of all facilities in all states.
- Future waste projections by type and volume.
- An analysis of existing collection and transportation routes.
- Identification of possible future landfill sites and an assessment for each site including soil permeability, groundwater level, and relationship to aquifers (underground streams).

2. Best Management Practices

From a water pollution control perspective, soil quality and relationship of the

*Address before the Symposium on Resource Conservation and Recovery, April 6, 1976

EPA

Recyclable Products Can Be Obtained From A Community's Trash. This Also Reduces Solid Waste Disposal Problems.

site to ground and surface waters are the most crucial factors in identifying acceptable locations for landfills. Ridges, hilltops, swamps, marshes, natural channels, and drainage basins should be excluded altogether because their use as disposal sites is virtually certain to lead to water pollution. Landfills should also be prohibited in any area that is in a 50-year floodplain and probably a 100-year floodplain.

Some state and local authorities rely primarily on impermeable liners to prevent liquid wastes from seeping into ground and surface waters. Clay is often used for such liners because it is relatively impermeable to liquids and does not react with most

A Poor Example Of Solid Waste Disposal. Areas Near Water Bodies Should Be Prohibited As Disposal Sites.

EPA

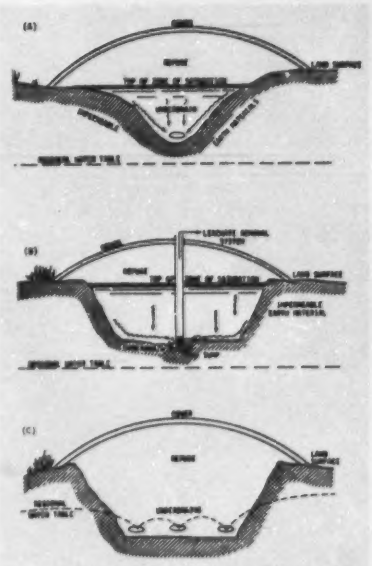
chemicals. Plastic and asphalt are also used as liners. Even relatively inert liners such as clay may react with certain chemicals and break. A liner broken in one place may draw liquids to it and result in water pollution as severe as would occur with no liner. Although strong liners should be required for all waste disposal sites, even a well-constructed liner may break if the landfill is not properly operated. Therefore liners must be supplemented by BMP's which should determine:

- Types of wastes that will be accepted at each site, as well as any type of wastes that will not be accepted.
- Pretreatment measures for certain types of wastes that will make them safe for disposal.
- Types of wastes which when mixed together may cause harmful chemical reactions become toxic, explosive, or inflammable. (The landfill site can be separated into "cells" as a means of keeping incompatible wastes apart.)
- The depth and compactness of wastes.
- The type, depth, compactness, and permeability of soil cover used to close the site.

Since water often causes chemical reactions and transports wastes, sites should be kept as dry as possible. Liners which prevent wastes from flowing out should also prevent groundwater from flowing into the site. Temporary covers can keep rainwater out of active sites. Sites which are no longer in use should be covered by impermeable material and graded to drain runoff away from the site. The collection and buildup of polluted liquid in both active and inactive sites should be prevented. This can be done by a drainage system which draws off liquids accumulating on top of the liner. The 208 agency should provide a plan to treat this liquid.

3. Regulatory Program

The most reliable control program is a permit system for all solid waste sites and facilities. To ensure that landfills do not pollute the water, the permit process for each new site should have several phases: Approval of the site, approval of the design and detailed site plan, approval of an operating plan, and inspections to see the operating plan is carried out. The operating plan should state the management practices to be followed at the site, identify the staff needed to operate the site properly, provide a schedule for equipment maintenance, provide measures to ensure that the site can be effectively closed once it is full, and state the exact types of wastes that the site will accept.



Hydrogeology of landfills with ways of using underdrains to control leachate migration. (A), above watertable in topographic low, (B) above watertable covers underdrain seepage tile laid collection is required; and (C) below the zone saturation.

EPA

4. Designating Management Agencies

Establishing a management agency for residual waste under the Clean Water Act should be coordinated with the designation of a management agency under RCRA. Management agencies could be one of two types: an agency which plans and carries out a residual waste disposal program, or one which administers a permit program under which other private of public agencies operate waste disposal sites.

In either case, attention should be given to the staff, budget, and legal authorities needed. If the agency will actually operate

disposal sites, it should have the authority to prohibit hazardous wastes, require pretreatment of hazardous wastes, and charge private operators for use of the site. Such an agency probably should not police itself. A separate watchdog agency, board, or commission should be responsible for the critical functions of site selection and inspection. If the agency is responsible for developing and administering a program under which others will operate disposal sites, it should have adequate authority to develop regulations and to write and enforce permits. It should also have sufficient staff and funding to carry out frequent inspections.

CITIZEN ACTION

1. Ask your Water Quality Management agency whether residual waste was determined to be a priority problem in the work plan or the state/EPA agreement.
2. If your 208 agency did not determine residual wastes to be a priority problem, find out which agency is carrying out the responsibilities set forth in RCRA . You may want to devote attention to this agency to ensure that it fulfills its responsibilities under that Act in a manner that will give adequate consideration to protecting water quality.

Salt Water Intrusion

Introduction

In most areas where surface or underground bodies of fresh water are in contact with salt water the boundary between them is relatively stable. If salt water moves into an area occupied by fresh water the salt water is actually a form of pollution, because it can destroy drinking water supplies, wildlife communities, farming operations and other activities which depend on the fresh water. This movement of salt water into areas occupied by fresh water is called salt water intrusion; 208 agencies must plan programs to prevent it.

Salt water intrusion can be caused by the construction of dams which reduce the amount of fresh water flowing downstream and allow sea water to push its way up the river channel. In other cases the pressure in a fresh-water aquifer is reduced when the fresh water is pumped out so that adjacent salty groundwater flows into the fresh water area. In Florida salt water intrusion into the groundwater is results from strip mining of phosphate. Fresh groundwater is draining inland into the strip mined areas. This reduces fresh water pressure in coastal areas and permits salt water to move toward the land and toward the surface. In western states salt strata below agricultrual lands can be dissolved by percolation of irrigation water from farming operations. The salty water then spreads through subsurface areas and seeps out to cause serious water quality problems and poison cropland. Saltwater aquifers can also be pierced by deepwell drilling and then spread into fresh water aquifers.

Severity of the Problem

Salt water intrusion in aquifers is almost as prevalent in inland states as in coastal states. According to EPA, only eight states do not have significant salt water intrusion problems.

A Program for Salt Water Intrusion

1. Technical Data

EPA recommends the following to identify salt water intrusion problems:

- Delineation of primary aquifers and streams.
- Analysis of historic salinity patterns.
- Monitoring of salinity changes in surface water and groundwater.
- Monitoring of fresh water/salt water boundaries.
- Hydrologic investigations to determine why salt water intrusion is occuring.

Areas likely to experience salt water intrusion should be examined. They include coastal areas where stream flows are being reduced, areas where hydrologic modifications are occurring, developing areas where runoff is increasing to the point that rainwater percolation to an aquifer is reduced, areas where aquifers are being pumped for water supply, and areas where drilling operations may have changed patterns of underground water movement.

A more complete hydrologic investigation should occur where salt water intrusion is proven or is highly probable. This will supply details of the relationship between water movements, geologic formations, and the effect of human activities on these relationships.

2. Best Management Practices and Regulatory Programs

Some of the solutions to salt water intrusion problems can come through the implementation of the Federal Safe Drinking Water Act of 1974 (Public Law 93-523). In particular, primary aquifers for drinking water are to be delineated and land development above them is to be controlled. Possible solutions to the salt water intrusion problem include:

- reducing pumping from fresh water aquifers;
- protecting naturally recharging aquifers by controlling land disturbances and development in wetlands and other surface recharge zones above those aquifers;
- preventing destruction of coastal wetlands, streams and rivers which act as buffers to prevent inland movement of salt water, especially during storms and high tides;
- maintaining surface flows of freshwater discharging into saltwaters in order to prevent upstream saltwater movement;
- regulating cropping and irrigation practices, that lead to saltwater intrusion;
- sealing the walls of existing wells so that salt water does not enter and then rise and flow into fresh water bodies;
- requiring the construction of new wells in a manner that will prevent saltwater from entering and flowing through the well pipe into fresh water bodies.

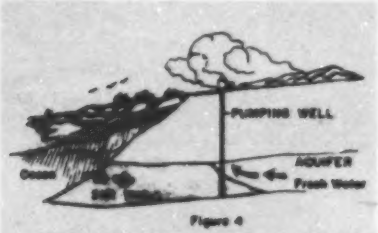


Figure 4

COASTAL SALT WATER INTRUSION CAUSED BY REDUCTION IN FRESH WATER FLOW.

3. Regulatory Program

It is most important to establish that the state has the legal authority and the responsibility to manage water resources to protect against salt water intrusion. Since activities which are not normally considered polluting, such as drilling a well, and activities which tie into other property rights, such as irrigating with pumped well water, will be involved, it may be difficult to gain acceptance of this principle.

In addition to establishing the basic regulatory authority, the regulatory program should provide for identification of problems; delineation of problem areas; monitoring; authority to prohibit activities which might cause or intensify saltwater intrusion in problem areas; authority to require BMP's authority to undertake remedial steps such as sealing wells; a means to finance monitoring; inspections, permitting, and redressive measures; and an enforcement capability against violators.

4. Designating Management Agencies

Few states have adequate management institutions to control saltwater intrusion, especially groundwater problems. Depending on the types of controls needed, responsibilities may be divided with different agencies doing problem assessment, monitoring, permitting and enforcement, and construction. If this is the case, inter-agency agreements will be needed and a single agency should oversee the entire program. A possible oversight agency might be the board or commission responsible for state water resources or state water quality. It is important that the oversight agency not be just a paper tiger. It needs staff and money to be sure that the agencies responsible for preventing saltwater intrusion are really doing their job.

CITIZEN ACTION

1. Urge that land use controls be established to protect primary and naturally recharging aquifers.
2. Ask your 208 agency to research the issue of the state's legal authority to manage

EPA

groundwater resources to protect their quality. If the state does not have this authority, ask 208 agency to prepare the necessary legislation.

3. Obtain a copy of "Identification and Control of Pollution from Salt Water Intrusion," (EPA-430-9-73-013) from the Water Planning Division. It is the source for most of the information in this section and contains additional information that will be useful in understanding the salt water intrusion problem and suggests BMP's to control several different types of saltwater intrusion.

4. Where safe drinking water programs are being established in your state, they may be the best programs to control some saltwater intrusion problems. You should be able to get information on your state's programs from your 208 agency, your state water pollution control agency, or EPA. Copies of the Safe Drinking Water Act and a short pamphlet on the Act (*Highlights of the Safe Drinking Water Act of 1974*) can be obtained without charge from the EPA Office of Public Affairs.

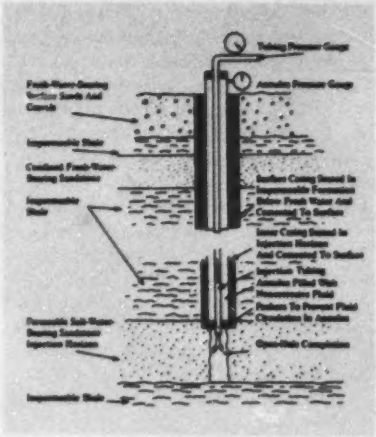
Well Injection of Wastes

Introduction

Well injection of wastes is the disposal of liquid wastes by drilling a deep hole down to permeable strata and force-pumping wastes into the strata. This practice has existed for many years, but only recently, as state and federal controls on the pollution of surface water bodies have become more stringent, has the number of wells grown substantially as a means to escape surface discharge controls. Thirty wells existed in 1960, 110 wells in 1967, and 333 wells in 1974.

Severity of the Problem

Toxic or highly polluted wastes do not degrade readily, if at all, underground. Once underground, the wastes are difficult to monitor, may be affected by pressure increases or changes in chemistry, and may drift and contaminate other wastes. The extraordinary blowout of the Hammermill Paper Company well in Erie, Pennsylvania which spilled huge quantities of highly polluted wastes into Lake Erie and threw equipment 30 feet into the air suggests the potential menance of such wells.



EPA, modified after Warner

Schematic Diagram Of An Industrial Waste Injection Well Completed in Sandstone

The Program for Well Injection

This program should cover existing wells, including an assessment of the threat they pose, how they will be regulated, responsibility to do it, and responsibility for any abandoned wells. It should also address general policy issues such as whether existing disposal wells will be allowed to continue operation indefinitely.

1. Technical Data

- An inventory of existing and planned wells.
- Type and volume of wastes discharged by existing and planned wells.
- Depth and design of wells.
- Characteristics of the strata into which wastes are pumped, including the capacity of the strata, water movement between the strata and any aquifers, and the permeability of surrounding soil or rock.
- The chemical relationship between wastes. Do any combine to form toxic substances? Inflammable substances? exposive substances?
- Coverage of wells by existing regulations.

2. Best Management Practices

Best Management Practices in well injection of wastes should be developed in conjunction with the permit program which must be developed under the authority of the federal Safe Drinking Water Act.

Some possible management practices include:

- Identifying areas where well injection should be prohibited because of soil permeability or possible use of the aquifer as a drinking water source.
- Prohibiting injection of dangerous wastes.
- Setting limits on the concentration and volume of wastes which can be discharged.
- Prohibiting injection of wastes which may react chemically to form dangerous compounds.

3. Regulatory Program

A number of states already regulate well injection of wastes. The Safe Drinking Water Act provides grants for states to develop programs for this purpose and requires EPA to develop regulations establishing minimum requirements for the state program. The Act specifies that after 1977 no underground injection well will be allowed if it has not received a state permit. States may not give permits if the underground injection could endanger drinking water sources. If any state program to control deep-well injection does not meet Drinking Water Act requirements, the Act requires EPA to regulate deep-well injection in that state.

A regulatory program should require an evaluation of alternative methods of disposal to see if well injection is the safest. The program should require a permit which covers proper design, construction, and operation; monitoring of well operations; and closing of abandoned wells. No well injection operation should be allowed without a permit. States which have environmental protection acts should require the preparation of a state environmental impact statement before a permit for well injection is given.

4. Designating Management Agencies

The well injection program is a state responsibility under the Drinking Water Act. The most appropriate agency to administer it will probably be the state water quality agency or board which is responsible for carrying out Drinking Water Act requirements.

CITIZEN ACTION

1. Call or write your state water quality agency to find out whether there is a state law governing well injection of wastes. Ask who administers it.
2. Ask the administering agency how many injection wells are currently operating in your state. If your state has injection wells, aks whether they have all received a permit.
3. Review your state's record in controlling deepwell disposal: Has your state's program been approved by EPA? Do all wells in the state have permits? Do the permits or permit applications include certification that the well is not close to any current or potential drinking water source? All wells should be so certified.
4. Urge your 208 agency, the state agency controlling well injection, and the governor to require such certification. Are permits monitored and enforced? Have any permit violations been discovered? What action has the agency taken against violators?

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